The AUTOMOBILE

May 15, 1913
10 Cents a Copy

The Stick-to-it-ive-ness of Cook's Lubricant

TAKE a handful of ordinary grease or oil and close your hand firmly. The grease or oil will squirt out and drop to the floor.

Now do the same with Cook's Lubricant. You positively cannot squeeze your hand "dry" and the excess grease that is squeezed out will hang on.

There is just this much difference between ordinary grease or oil and Cook's Lubricant when used in gear cases or differentials. Ordinary greases are squeezed out from between the gear teeth allowing the teeth to come into metallic contact, wearing them down and wasting power. Cook's lubricant, on the other hand, sticks to the gears and is churned up and carried round and round with them. It is always between the teeth and is not busy *lubricating* the corners of the crank case.

To Dealers Cook's Lubricant is not only easy to sell —but it stays sold, and brings repeat orders. That is the kind of a product you are interested in. Write for our New Dealers' Proposition.

AUTO DEPT.

ALBANY LUBRICATING CO.

ADAM COOK'S SONS, Prop.

708-710 Washington St. **New York**

103

VOL. XXVIII NEW YORK—THURSDAY, MAY 15, 1913—CHICAGO No. 20

The AUTOMOBILE

Vulcan Wins Washington Contest

Carries 1 Ton 1 Mile at a Cost of 1.22 Cents—Great Reliability of Commercial Car Shown by Fact That Every Car Starting Finished Run — Six Out of Eighteen Have Perfect Road Scores

All Six Trucks Finishing with Perfect Score Were Put Through Rigid Technical Test and Came Out With Clean Slate—Result Depended on Fuel Economy

WASHINGTON, D. C., May 9—The announcement of the final results of the 4-day motor truck demonstration conducted by the *Washington Post* was made tonight and the 4-ton Vulcan, which was No. 1 in the contest, was declared the sweepstake winner on the ton-mile basis used in determining the results. This truck carried 1 ton 1 mile at a rate of 1.22 cents. In dollars its figure is, ton-mile cost $.0122. This truck was the only one in its division. Each of the other divisions had its winner, as set forth in the tabulation herewith. Thus, Division 5 K, No. 16, Atterbury, ton-mile cost, 1.72 cents; Division 4 K, No. 18 White, ton-mile cost, 1.40 cents; Division 3 K, No. 5 Wilcox, ton-mile cost, 2.6 cents; Division 2 K, No. 17 White, ton-mile cost, 2.38 cents; Division 1 K, No. 19 International, ton-mile cost, 3.47 cents, and Non-Contesting Division, No. 102 White, ton-mile cost, 2.76 cents. In Division 6 K there was only one contestant, namely, No. 8 Rowe, which had a ton-mile cost of 2.62 cents.

Final Results

SWEEPSTAKES WINNER

			Ton-Mile Cost
No. 1, Vulcan	4 tons	8 M.P.H.	$.0122

DIVISION 6 K, 4001 TO 5000 POUNDS

No. 8 Rowe	2.5-tons	10 M.P.H.	$.0262

DIVISION 5 K, 3001 TO 4000 POUNDS

No. 16 Atterbury	2-tons	10 M.P.H.	$.0172
No. 12 Lauth-Juergens	2-ton	10 M.P.H.	$.0214

DIVISION 4 K, 2001 TO 3000 POUNDS

No. 18 White	1.5-ton	10 M.P.H.	$.0140
No. 10 McIntyre	1.5-ton	10 M.P.H.	$.0181
No. 11 Autocar	1.5-ton	10 M.P.H.	$.0183
No. 15 Atterbury	1.5-ton	10 M.P.H.	$.0185
No. 2 Mais	1.5-ton	10 M.P.H.	$.0220
No. 4 Witt-Will	1.25-ton	10 M.P.H.	$.0289

DIVISION 3 K, 1501 TO 2000 POUNDS

No. 5 Wilcox	1-ton	11 M.P.H.	$.0260
No. 14 Atterbury	1-ton	11 M.H.P.	$.0270
No. 3 Little Giant	1-ton	11 M.P.H.	$.0277

DIVISION 2 K, 1001 TO 1500 POUNDS

No. 17 White	.75-ton	12 M.P.H.	$.0238
No. 13 Atterbury	.75-ton	12 M.P.H.	$.0279
No. 20 Atterbury	.75-ton	12 M.P.H.	$.0411

DIVISION 1 K, 1000 POUNDS AND UNDER

No. 19 International	.5-ton	12 M.P.H.	$.0347
No. 9 Hupmobile	.4-ton	12 M.P.H.	$.0474

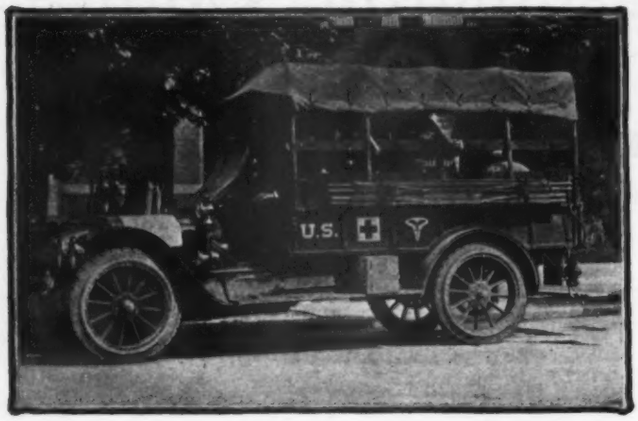
NON-CONTESTANTS, U. S. AMBULANCES

No. 102 White	8 Persons	12 M.P.H.	$.0276
No. 101 Brown	8 Persons	12 M.P.H.	$.0442
No. 101 Four-Wheel-Drive	8 Persons	12 M.P.H.	$.0525

Eighteen contesting trucks of various capacities started on the run and all eighteen finished under their own power. Three non-contesting United States Government ambulances carrying eight passengers each made the complete trip.

The run proved a strenuous test for all of the trucks, which carried their rated load capacities throughout the trip. The run each day was short, but bad roads were encountered in many places and a great many penalties were assessed. Six trucks, however, were able to complete the road circuit with perfect road scores, these being Mais, Wilcox, McIntyre and three Whites. After the road work was over the cars were given outdoor tests of brakes, clutches, gearboxes and a final examination and all of these six took these tests and passed the examination with a clean score. This done, the final result depended upon the amount of gasoline and the number of gallons of oil used. Gasoline was charged for at

Vulcan contestant and two of the Whites, one 3000 and the other a 1500-pound capacity as they appeared on the road



U. S. Army Ambulance which participated in the Washington run

White touring car with officials which followed the run and noted the work of the contestants

No.	Name	EMPTY			LOADED		
		Total	Front	Rear	Total	Front	Rear
1	Vulcan	7270	3300	4430	15370	4260	10960
2	Mais	6100	2960	3020	9150	2800	6220
3	Little Giant	3120	1580	1520	5200	1900	3240
4	Witt-Will	4400	2200	2140	6685	4180	2450
5	Wilcox	4240	1900	2250	6260	1925	4250
8	Rowe	6400	2480	3860	11435	2330	9000
9	Hupmobile	2300	1100	1200	3120	1150	1940
10	McIntyre	4540	2200	2260	7575	2640	4850
11	Autocar	4060	1960	2050	7125	3030	3950
12	Lauth-Juergens	5650	2750	2820	9715	3300	6350
13	Atterbury	3120	1350	1720	4720	1500	3160
14	Atterbury	4100	1675	2425	6150	1800	4325
15	Atterbury	4400	1800	2580	7475	2100	5240
16	Atterbury	5550	2275	3225	9650	2475	7150
17	White	3600	1650	1900	5175	1850	3300
18	White	4920	1950	2900	7950	2200	5675
19	International	2600	1200	1320	3675	1220	2360
20	Atterbury	3160	1400	1750	4680	1400	3250

a rate of 20 cents a gallon and the oil at 45 cents per gallon. These costs, together with the loads carried, were used as a basis of computing the ton-mile cost. Where points penalty were assessed the costs were also charged.

One of the interesting features of the run was the government representation, the army having three ambulances and a carload of officials, who followed every detail of the trip, noted the performances of the competing vehicles and made measurements on the majority of the contestants.

The trucks showed up remarkably well throughout the contest, and, although thirteen of the eighteen contesting vehicles received road penalties against them, the majority of these penalties were for minor troubles. Many of them were for adjusting carbureters and cleaning out gasoline feed lines. A number of the trucks had to take on water outside of controls and were penalized therefor. Others had to replenish oil between the starting and finishing points of each forenoon or afternoon run. Others received penalties for broken driving chains, leaky radiators, etc.

No. 1 Vulcan, the sweepstake winner, had 217 points against it for road work and 20 points in the technical examination, but it won out on its gasoline and fuel cost. It used but 5 quarts of oil on the run, which was remarkable for so large a truck. This truck had particularly great difficulty on the first day out due to getting stuck on the Middlebrook hill and making it necessary to unload part of its 4 tons, ascend the hill with one-half a load, unload it at the top and return for the second half. This caused heavy time penalties against the truck. During the remainder of the trip it did not have any similar difficulties. On the Middlebrook hill a dozen of the other contestants had to be assisted.

Four-Wheel Drive Ambulance Does Well

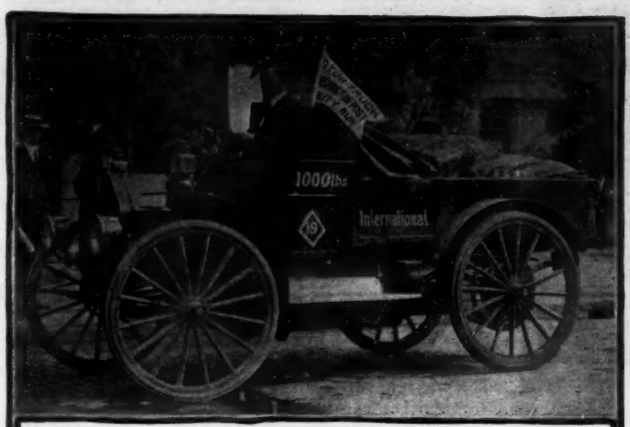
The performance of the three White trucks stands out conspicuously. Two of them had clean scores throughout, but the third lost on both road work and in technical examination.

The Four-Wheel-Drive government ambulance was one of the interesting vehicles of the trip. On the first day it demonstrated the superiority of driving through all four wheels when ascending Middlebrook hill. It pulled to the side of the road and moved up past the stalled vehicles without any difficulty. A difficulty befell this truck on the last day's run when the differential between the gearbox and the front axle broke so that the truck had to complete its trip driving through the rear wheels only.

The lowest consumption of gasoline on the trip was made by No. 17 White with 1,500-pound load. It required but 22.125 gallons. The next lowest was No. 19 International, 1,000-pound load, 24.19 gallons, and third was No. 9 Hupmobile, 800 pounds, with 25.125 gallons. Fourth place was taken by No. 102 White ambulance, which consumed 26.5 gallons.

The consumption of oil was estimated by quarts. The lowest consumption was 1.5 quarts by No. 19 International, 1,000 pounds load, the cost being 17 cents. Next came No. 16 Atterbury, 4,000 pounds, 2 quarts, cost 23 cents. No. 14 Atterbury was third, with an oil cost of 34 cents. The highest oil cost of the trip was No. 20 Atterbury, 1,500 pounds, using 18 quarts at a cost of $2.03. The winning Vulcan used 5 quarts, its cost for oil being 56 cents. The amount of gasoline and oil used and the cost of each are given in the general tabulation.

During the test or demonstration every precaution was taken to prevent tampering with the vehicles. An observer rode on each truck and he did not leave it from the time it was checked out in the morning until it reached the noon control, where it was kept under watch by the officials. The same program was followed during the afternoon runs. Each night the cars were parked in a roped-off space and police watched them. The gasoline and oil were carefully checked at each filling, an official watching the measuring. At the end of the run the gasoline and oil measurements were made to correspond with those at the start of the run so that the utmost accuracy was obtained.



Upper: One thousand pound International motor truck
Lower: One ton Wilcox car entered by the Columbia Coal and Brick Co., which made a good showing

Interest Aroused Along the Route

Throughout the run much interest was shown in every town and city passed through and also along the country roads. The parking space at noon and night was crowded outside the ropes with business men who wanted to see the trucks and who talked business with the representatives in not a few cases. The only way in which the run might have been improved so far as making it a greater merchandising proposition is concerned would have been to have spent 1 day in Harrisburg, Pa., where the contestants could have been witnessed in their all-day work by the citizens and business men.

The trucks carried throughout the run their full rated capacity. The majority of the loads were bags of gravel, but a few carried merchandise consisting of barrels or boxes. The speeds

Lauth-Juergens, Autocar, Atterbury and Hupmobile entrants as seen along the line of the route

No.	Car Name	ROAD PENALTIES					Test Br.	Test Cl.	Test Tr.	Test Tech.	Total	Gallons Gasoline	Gasoline Cost	Quarts Oil	Oil Cost	Grand Total Cost	Ton-Mile Cost
		1-Day	2-Day	3-Day	4-Day	Total											
1	Vulcan	158	31	13	15	217	0	0	0	20	237	70.75	$14.15	5	$ .56	$14.95	$.0112
2	Mais	0	0	0	0	0	0	0	0	0	0	43.19	8.64	8.125	.91	9.55	.0220
3	Little Giant	12	0	0	0	12	0	0	0	31	43	34.625	6.92	9.25	1.04	8.00	.0277
4	Witt-Will	39	4	0	22	65	0	0	0	1	66	42.25	8.45	7.50	.84	9.36	.0289
5	Wilcox	0	0	0	0	0	0	0	0	0	0	30	6.00	14	1.52	7.52	.0260
8	Rowe	46	1	70	8	125	0	0	0	33	158	84	16.80	17.75	2.00	18.96	.0262
9	Hupmobile	0	0	8	0	8	0	0	0	0	8	25.125	5.03	4	.45	5.48	.0474
10	McIntyre	0	0	0	0	0	0	0	0	0	0	32.5	6.50	12	1.35	7.85	.0181
11	Autocar	20	3	9	3	35	0	0	0	1	36	35.375	7.08	7.5	.84	7.96	.0183
12	Lauth-Juergens	0	0	3	129	132	0	0	0	1	133	51	10.20	18	2.03	12.36	.0214
13	Atterbury	3	0	13	0	16	0	0	0	15	31	27	5.40	5.5	.62	6.05	.0279
14	Atterbury	6	0	0	63	69	0	0	0	1	70	37	7.40	3	.34	7.81	.0270
15	Atterbury	92	9	22	0	123	0	0	0	1	124	35	7.00	8	.90	8.02	.0185
16	Atterbury	29	0	0	3	32	0	0	0	1	32	48.5	9.70	2	.23	9.96	.0172
17	White	0	0	30	0	30	0	0	0	15	45	22.125	4.43	6	.68	5.16	.0238
18	White	0	0	0	0	0	0	0	0	0	0	27.625	5.52	5.125	.58	6.10	.0140
19	International	0	0	0	0	0	0	0	0	0	0	24.19	4.84	1.5	.17	5.01	.0347
20	Atterbury	0	128	27	0	155	0	5	0	0	160	34.25	6.85	18	2.03	9.04	.0417
100	Brown	3	0	19	1	23	0	0	0	2	23	35	7.00	14	1.57	9.59	.0442
101	F-W-D	0	15	10	272	297	24	0	0	151	472	51	10.20	6.75	.76	11.43	.0525
102	White	0	0	0	0	0	0	0	0	0	0	26.5	5.30	6	.68	5.98	.0276

NOTE.—Under columns for each of the first four days are the penalty assessed for day with a total road penalties in the following column. Br.—Penalties for brake test. Cl.—Penalties for clutch test. Tr.—Penalties for transmission test. Tech.—Penalties imposed in technical examination.

The Mais truck was one of the heavier contestants and went through the run without penalization

The Little Giant truck was penalized 12 points on the road the first day, but went through with that total

The Witt-Will truck was entered by the only builder of motor trucks in Washington, D. C.

The trucks followed each other closely into the checking-in stations, at which points there was always a crowd of spectators

averaged were varied according to the loads carried and were as follows: 1,500 pounds and under, 12 miles per hour; 1,501 to 2,000 pounds, 11 miles per hour; 2,001 to 5,000 pounds, 10 miles per hour; 5,001 to 8,000 pounds, 9 miles per hour. These speeds were too slow for average country touring as the trucks were invariably well ahead of schedule.

The route was divided into eight divisions, one for each forenoon and one for each afternoon. These were as follows:

Monday, May 5: forenoon, Washington to Frederick, Md., 43 miles; afternoon, Frederick to Hagerstown, 25.9 miles.

Tuesday, May 6: forenoon, Hagerstown, Md., to Shippensburg, Pa., 32 miles; afternoon, Shippensburg to Harrisburg, 38.7 miles.

Wednesday, May 7: forenoon, Harrisburg to Columbia, 31.5 miles; afternoon, Columbia to Hanover, 33.8 miles.

Thursday, May 8: forenoon, Hanover to Baltimore, Md., 43 miles; afternoon, Baltimore to Washington, 40.8 miles.

In determining the winner the following factors were considered: Number of gallons of gasoline at 20 cents per gallon; number of gallons of oil at 45 cents per gallon; penalties on road for doing work on car or being late at controls, 10 points, penalty being equivalent to 1 cent; an outdoor test at the end of the run of brakes, clutch and gearset; and a technical inspection at the end of the run for broken parts, all penalties in this being on a basis of 1 cent for every 10 points. In arriving at the final result the grand total of cost from these various sources was obtained. The ton-miles work done by each truck during the run was computed by multiplying the total mileage 288.7 by the rated load of the truck in tons. This product was divided into the total cost. The results show that the winner carried 1 ton 1 mile at 1.22 cents cost. In the tabulation the cost is given in dollars.

Gasoline Measured at 20 Cents a Gallon

Considerable criticism was heard relative to the method of calculating total cost in that the gasoline and oil consumed were in too great proportion to the cost assessed for work done on latest in arrival in control. To explain: A gallon of gasoline amounted to 20 cents in the final calculation. Two hundred points penalty at the rate of 1 cent per point equaled the same cost as a gallon of fuel. Thus a car could be 200 minutes late and this penalty would amount to but 20 cents or the same as a gallon of fuel. A truck being 3 hours late on schedule should have a greater cost debited against it than this. In other words the real winner was determined on a fuel economy basis rather than on a reliability basis. The final result showed six cars to make perfect scores on the road; perfect scores in the brake, clutch and transmission test and perfect scores in the technical examination. Yet none of these six was adjudged the sweepstake winner and, in fact, several of them were not winners in their own divisions because of the amount of fuel they consumed.

The work of the Vulcan, the sweepstake winner, was conspicuous from start to finish, because it was the largest capacity truck in the contest, carrying a useful load of 4 tons, the next largest truck to it being one with a capacity of 2.5 tons. The results would tend to show that there was a satisfactory ratio between the motor size and the load carried in this truck.

The history of the Vulcan throughout the run shows that it suffered penalties each day on the road. On the first day, due to an accident of some rope getting entangled with the driving chain on one side the chain was broken and a 100-point penalty assessed. The truck was also 29 minutes late because of its trouble on Middlebrook hill. On the second day the fan belt bracket loosened and the fan blades cut into the radiator, penalty being 31 points. On the third day there was more fan bracket and radiator trouble, resulting in an assessment of 13 points. On the fourth day there were more similar troubles and 15 points penalty annexed. In the final examination 20 points more were added for the leaky radiator.

The greatest competition of the demonstration occurred in Division 4K with trucks of loading capacity from 2,001 to 3,000

pounds. There were six contestants, namely, White, McIntyre, Autocar, Atterbury, Mais and Witt-Will. All had 1.5-ton capacity except the Witt-Will, which is 1.25 ton. The White proved the winner and its ton-mileage cost in the entire classification of the run was next to the Vulcan. Its figure was 1.4 cents per ton-mile. It had a perfect road and technical test. There were other close contests in this trial as McIntyre, Autocar and Atterbury were very close. The final ton-mile figures showed how close was the fight. Here are the figures; McIntyre cost 1.81 cents; Autocar ton-mile cost, 1.83 cents; and Atterbury ton-mile cost 1.85 cents.

The contest for the Divisional prize in Division 3K, 1,501 to 2,000 pounds was equally close, but the Wilcox proved winner. The ton-mile figures are: Wilcox, 2.6 cents; Atterbury, 2.70 cents; and Little Giant, 2.77 cents. The ton-mile cost of this class is considerably higher than that for the 4K Division or 2,001 to 3,000-pound trucks. No. 5 Wilcox, winner of this division, had a clean road and technical score. It used $6 worth of gasoline and $1.52 worth of oil at a total cost of $7.52. The cost of the Atterbury was $7.81 and the Little Giant $8.

In the 1,001 to 1,500-pound trucks, of which there were three contesting, the ton-mile cost was less than in the 1,501-2,000 division, the figure being 2.38 cents for the winning White. Atterbury, finishing second, had a cost of 2.79 cents per ton-mile and the Atterbury finishing third was much higher.

The winning International in the class of 1,000 pounds and under had a clean road and technical score and the total cost of gasoline and oil for the 288.7 miles was $5.01. The Hupmobile, the other contestant in this division, would have had a clean road and technical score had it not been for a gasoline leak when 11 miles out of control on the third day which caused the penalty of 8 points being imposed.

Atterbury Wins 3,000-Pound Class Contest

There were only two contestants in the class 3,001 to 4,000 pounds, both being 2-ton trucks. The winning Atterbury had a ton-mile cost of 1.72 cents per mile. This car received road and technical penalties. The first day out it took on water; the second day its score was clean and the third day clean, fourth day water and in the technical examination it received 1 point for a water leak. The Lauth-Juergens was second in this division. It had a clean score on the first 2 days; had to take oil on the third and had engine bearing trouble on the fourth day. In the technical examination it received 1 point penalty for the end, being off the shutter-valve operating rod.

Of trucks of 4,001-5,000 pound capacity the Rowe was the only contestant. Its ton-mileage figure was 2.62 cents. On the road it had to repair the fan belt the first day; had trouble with the gasoline line the second; had trouble with the gasoline line the third day and received penalties the fourth day. In the technical examination it was assessed 8 points.

The following tire report was issued by the Technical Committee at the completion of the run of 288.7 miles. Some of the tires were abnormally cut for so short a run. There was one case of a tire blowing out during the first half day of the trip. There was one example of block tires which were practically used up from the distance. The following are the reports as issued:

No. 1 Vulcan, gross load, 15,370 pounds, Goodrich demountables, front 36 by 5, rears 36 by 5 dual. "Inside left rear cut badly in one place, slight cuts in others. Tires stood up well owing to the overload and speed."

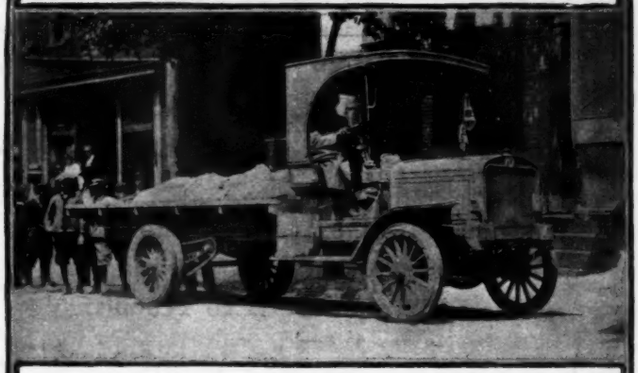
No. 2 Mais, gross load, 9,050 pounds, Polack, fronts 36 by 3.5, rears 37 by 5.5. "Right rear slightly cut on the inside on account of sharp obstacle. All others in fine shape."

No. 3 Little Giant, gross load, 5,200 pounds, Goodrich wireless pressed on, fronts 36 by 3.5, rears 40 by 4. "A few slight cuts on the right rear inside. Others slightly cut."

No. 4 Witt-Will, gross load, 6,685 pounds, Firestone side wire, fronts 36 by 2, rears 36 by 2.5. "Right rear a few slight cuts. Right front slightly worn on outside edge."

(*Continued on page* 1038)

The U. S. Army vehicles made good showing in the run under the close inspection of government officers



McIntyre 3,000-pound truck escaped penalization on the road for the entire 4 days and also in the technical test

Atterbury No. 16 and Atterbury No. 13 made the best records of the Atterbury team of four

Some of the roads through which the contestants had to work their way were not of hard surface

The new Automobile Chamber of Commerce. From left to right the members are: Standing—L. H. Kittredge, H. H. Rice, W. C. White, H. O. Smith, A. L. Pope, W. C. Leland, Alvan Macauley, S. A. Miles, J. S. Marvin, H. A. Bonnell. Sitting—A. L. Prindle, W. E. Metzger, Charles Clifton, George Pope, C. C. Hanch

N. A. A. M. Now Formally Dissolved

Indianapolis Company Announces Cyclecar—Will Be Ready in May—Fletcher Sells to Roebling

NEW YORK CITY, May 13—The Automobile Chamber of Commerce was incorporated on March 18 by the fourteen who had comprised the executive committee of the N. A. A. M. and C. C. Hanch, the only director of the Board of Trade who was not also a member of the executive committee of the N. A. A. M.

The N. A. A. M. was formally dissolved at a meeting held in Hartford, Conn., last week, as the law of that state, under which the N. A. A. M was incorporated, demands a two-third vote of the membership in case of dissolution The meeting was held at the offices of the Pope Mfg. Co. and the vote was unanimous.

All of the departments of the old associations will be continued under the same management. S. A. Miles, for 10 years general manager of the N. A. A. M., retains that position with the new organization with H. A. Bonnell as assistant general manager. The traffic department remains in charge of J. S. Marvin and the commercial vehicle work in charge of H. W. Perry, to whose department will probably be added a bureau of publicity, with particular reference to the interests of good roads.

The officers of the Chamber of Commerce are:

Charles Clifton, president; Wilfred C. Leland, vice-president; Hugh Chalmers, vice-president, in charge of the gasoline vehicle department; W. T. White, vice-president, in charge of the commercial vehhicle committee; H. H. Rice, vice-president, in charge of the electric vehicle department; George Pope, treasurer; R. D. Chapin, secretary.

The committees so far appointed are as follows:

Patents Committee—C. C. Hanch, W. H. Van Dervoort, L. H. Kittredge, Alvin Macaulay and L. E. Latta.

Show Committee—George Pope, H. C. Smith and W. C. Leland.

Traffic Committee—A. L. Pope, W. E. Metzger and H. H. Rice.

Legislative Committee—J. N. Gunn, G. H. Stilwell and J. I. Farley.

The next meeting of the Board of Directors will be held at the association's offices on Wednesday, June 4.

Indianapolis Cyclecar Out Soon

INDIANAPOLIS, IND., May 12—Local capitalists and motor car men are behind the Economy-car Co. which is being organized to manufacture cyclecars. Details of the company and the names of the men behind it will not be made public for several days. A sample car is being built and will be exhibited the week of the 500-mile race to be held at the Indianapolis Motor Speedway, May 30. It is probable the company will enter a car in the Indiana to the Pacific tour which starts from Indianapolis, July 1.

The car to be built will have a two-cylinder, 8-10 horsepower, air-cooled motor, a wheelbase of 106 inches and a tread of 36 inches. Wire wheels will be employed and two models will be built, one a tandem.

Flechter Sells Out to Roebling

NEW YORK CITY, May 12—The manufacturers of the Flechter carbureter, L. V. Flechter & Co., have assigned their business and the entire manufacturing and selling rights of the above-named carbureter to the Trenton Brass & Machine Co., of Trenton, N. J. The latter concern is under the control of C. G.

Automobile Securities Quotations

Trading this week was limited and stock prices fluctuated, the quotations at the closing of the week being given below. Rubber Goods was almost the only issue which gained.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	..	130	155	..
Ajax-Grieb Rubber Co., pfd	95	100	95	..
Alumnium Castings, pfd	100	..	98	101
American Locomotive Co., com	43¼	43¾	32	33
American Locomotive Co., pfd	108	109½	100	103
Chalmers Motor Company, com	..	..	128	135
Chalmers Motor Company, pfd	..	..	99	102
Consolidated Rubber Tire Co., com	10½	11	14	18
Consolidated Rubber Tire Co., pfd	40	..	60	75
Firestone Tire & Rubber Co., com	262	264	258	261
Firestone Tire & Rubber Co., pfd	107	109	105	106½
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	100
Garford Company, preferred	99	101	99	100½
General Motors Company, com	33½	34	25	29
General Motors Company, pfd	72	74	70	75
B. F. Goodrich Company, com	84	85	31	32
B. F. Goodrich Company, pfd	107	108½	91	94
Goodyear Tire & Rubber Co., com	236	240	320	326
Goodyear Tire & Rubber Co., pfd	105	106	98½	99¾
Hayes Manufacturing Company	..	104	..	90
International Motor Co., com	33	35	5	6
International Motor Co., pfd	93	96	10	15
Lozier Motor Company	..	55	..	20
Maxwell Motor Co., com	..	..	3	6
Maxwell Motor Co., 1st pfd	..	..	40	50
Maxwell Motor Co., 2nd pfd	..	..	12	16
Miller Rubber Company	160	165	138	149
Packard Motor Car Company, pfd	105	106½	98	102
Peerless Motor Car Company, com	..	..	35	45
Peerless Motor Car Company, pfd	..	..	95	100
Pope Manufacturing Co., com	30	34	14	16
Pope Manufacturing Co., pfd	74½	75½	49	51
Portage Rubber Co., com	..	..	..	45
Portage Rubber Co., pfd	..	..	85	90
Reo Motor Truck Company, par 10	9	10½	10½	11½
Reo Motor Car Company, par 10	24	25	20	21¼
Rubber Goods Mfg. Co., pfd	104	109	107	112
Studebaker Company, com	38½	40	27	28
Studebaker Company, pfd	96	98	89	91½
Swinehart Tire Company	112	114	85	90
U. S. Rubber Co., com	6	7	61½	62
U. S. Rubber Co., 1st pfd	25	28	103¾	104¾
White Company	107½	108½	107	109
Willys-Overland Co., com	..	..	64	69
Willys-Overland Co., pfd	..	..	85	92

Packard Motor Will Run for 300 Hours

Roebling and F. W. Roebling and employs 200 men; the manufacturing equipment of the Flechter concern will immediately be shipped to Trenton, where manufacturing will be continued. There will be a New York sales and distributing branch, with L. V. Flechter as general sales manager. At present the Trenton company manufactures plumber and hardware articles, but the intention is to gradually apply all the manufacturing force to the making of carbureters.

Paige-Detroit Builds Huge Addition

DETROIT, May 10—The Paige Motor Car Company has completed the plans for the erection of new buildings which will have an aggregate area of 225,000 square feet and will be large enough to house the entire organization, both manufacturing department and executive offices. The new plant will be situated on McKinstry street, between Fort street and the tracks of the Wabash and Père Marquette railroads, on a plot of ground 900 feet in length by 170 feet in width.

Location in proximity to the railroads will afford ideal shipping facilities. The architect is the John Scott Co., who has planned a most modern factory in every particular. Ground is to be broken at once for this latest of Detroit's factories. The buildings will be in the shape of an H and they will be of fireproof reinforced concrete construction, having a complete sprinkling system. The wall surface of the plant will be practically entirely of glass, the front, facing the west, being of ribbed glass to lessen the sun's glare, while the east side will be of plain glass.

The main building will be 406 feet long by 60 feet wide and three stories in height, giving a total working space of 107,000 square feet, or nearly 2.5 acres.

It is stated by H. M. Jewett, head of the Paige concern, that the imperative need for a new plant is evidenced by the fact that the company is now 22 weeks behind with its orders although working to utmost capacity with existing facilities. It is planned to make the first year's output at the new factory 15,000 machines, while during the year following 25,000 cars are to be made, it is said.

The new plant will provide facilities for the manufacture of more of the parts of the Paige-Detroit cars than has heretofore been possible. Motors and transmissions will continue to be made under the plant's supervision.

Market Changes of the Week

Few changes occurred this week in the markets and those which did take place were immaterial with the exception of tin which was affected by a slump of $.73, due to the lower London cables which put somewhat of a damper on speculative operations. The lack of disposition to trade on the part of operators, together with the dull consuming demand, presented a rather inactive market. Prices receded from $50.63 on Wednesday to $49.90 on Tuesday. The lead market is dull. Buying is very light, with prices somewhat easier. Lead on call at the Metal Exchange $4.35 was bid and $4.40 was asked for all deliveries. Both coppers experienced slight raises in prices, electrolytic copper, $00 3-4, and Lake, $.00 1-8. Antimony rose $.00 1-8 on Monday. Cottonseed oil was very dull, prices fluctuating, but to no great degree, remaining around $6.90 and $6.91 a barrel. A lack of demand seems to be the cause.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Change
Antimony, lb....	.07⅜	.07⅜	.07⅜	.07⅜	.07½	.07½	—.00⅛
Beams & Channels, 100 lbs...	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	29.00	29.00	29.00	29.00	29.00	29.00	.....
Copper, Elec., lb.	.15⅝	.15⅝	.15⅝	.15⅝	.15¾	.15 7/10	+.00 3/40
Copper, Lake, lb.	.15⅝	.15⅝	.15⅝	.15⅝	.15¾	.15¾	+.00⅛
Cottonseed Oil, bbl.....	6.90	6.92	6.92	6.93	6.93	6.91	+.01
Cyanide Potash, lb.....	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown.	.33	.33	.33	.33	.34	.34	+.01
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs....	4.35	4.35	4.35	4.35	4.35	4.35	.....
Linseed Oil.....	.48	.48	.48	.48	.48	.48	.....
Open-Hearth Steel, ton.....	29.00	29.00	29.00	29.00	29.00	29.00	.....
Petroleum, bbl., Kansas crude..	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude.....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy..	....	4.35	....	....	4.35	4.35	.....
Silk, raw Japan..	....	3.70	....	....	3.70	3.70	.....
Sulphuric Acid, 60 Baumé	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.....	50.63	50.38	50.10	50.10	50.10	49.90	—.73
Tire Scrap.....	.10	.10	.10	.10	.10	.10	.....

Change of Spark Plugs and Two Adjustments on One Tappet Only Attention Given to the Motor Adjustment

NEW YORK, May 14—At 10:43 a. m. today the Packard Motor on test had finished 10.5 days of continuous running. In this time the car would have covered about 1350 miles at a rate of 37 miles an hour against a resistance equivalent to a grade of 6.5 per cent.

NEW YORK, May 13, 7 P. M.—The Packard motor on test at the A. C. A. laboratory in this city had run 236 hours at 6:43 this evening. It passed the 200-hour mark on its continuous run at 6:43 a. m. Monday. Running at 1,200 revolutions per minute steadily the motor would have pulled the Packard 38 car 7,492 miles in 200 hours. The fuel consumption averages just above 100 gallons per day, and at this figure would carry the car at a rate of 9 miles to the gallon. The only adjustments made have been the substitution of two new spark-plugs and two adjustments of the exhaust valve tappet on the No. 1 cylinder. A valve cover was also tightened during the run.

The test will be continued for 300 hours, ending at 10:43 a. m. Friday. During this time the horsepower is not allowed to drop below 70 per cent. of the maximum of 45. No important mishaps have occurred, a slight breakage of the gasoline line which did not damage being the nearest approached. The motor has been averaging in the neighborhood of 35 horsepower since shortly after the beginning of the run.

NEW YORK, May 14, 9 A. M.—The adjustment of the exhaust valve tappet on No. 1 cylinder at the 147th and again at the 152d hour of the test has aroused criticism in that it is construed as a violation of rule 5 under which the tests are being made. The part of this rule in question is "No adjustments of the motor or its accessories, which directly affect the quantities being measured, will be permitted after the first official test run has been started, except as provided in rule ...." The view expressed by the critics is that adjusting the tappets is an adjustment which would affect the power, which is one of the quantities being measured in the test. Professor Hutton who has charge of the A. C. A. laboratory and Herbert Chase, laboratory engineer, held a conference on the subject yesterday and decided that under rule No. 5, as quoted, the adjustment of the tappet was permissible.

S. A. E. Getting Ready for Detroit

NEW YORK CITY, May 13—The entertainment committee of the Metropolitan Section of the S. A. E. held a meeting yesterday to confer on the welcome and the details of the entertainments to be extended to the British engineers who will arrive in town on May 26, to leave for Detroit two days later.

Ideal Changes Name to Stutz

INDIANAPOLIS, IND., May 12—Announcement is made that the name of the Ideal Motor Car Co., maker of the Stutz car, has been changed to the Stutz Motor Car Co.

Batavia Annual Meeting Held

BATAVIA, N. Y., May 14.—The stockholders of the Batavia Rubber Co. held their annual meeting here yesterday, at which Vice-President A. W. Caney was elected president for the ensuing year, and Geo. E. Perrin vice-president. The stockholders voted that the company proceed legally against any competitors infringing on any of the rights of the Batavia concern and that the plant of the company be extended during next year. The present capacity of the factory is from 125 to 150 tires a day.

CHICAGO, May 13.—Three garage fires, all taking place within 30 hours on the south side of the city and destroying 132 cars at an estimated loss of $420,000 has resulted in an investigation by the fire attorney's office.

Texas Discourages Clubs

Motor Spirits Patent Right Disputed—Standard Oil Defends It

AUSTIN, TEX., May 10—The State Supreme Court has been called upon to decide the question of whether automobile clubs and kindred organizations may legally be incorporated in Texas. Acting on an opinion given from the attorney general's department that such organizations could not be chartered under the statute granting charters to bicycle clubs and such other innocent sports, Secretary of State John L. Wortham has refused to grant a charter to the Dallas Automobile Club Building Association of Dallas. This latter organization has filed a mandamus petition in the supreme court to compel Mr. Wortham to grant it a charter.

Motor Spirits Patent Questioned

CHICAGO, ILL., May 12—An article appearing in the April issue of one of the oil trade journals under the heading "Is Standard Using Old-Time Process?" questions the priority of the Burton patents for the manufacture of the Standard Oil Co.'s new motor fuel called Stanolind Motor Spirits. It seems that as early as 1890 Sir Boverton Redwood and James Dewar, both of England, patented in the United States a process for the production of light oils by pressure distillation. The Dewar-Redwood patent was obtained at a time when burning oil was the chief product wanted and gasoline practically was thrown away. The article referred to expresses the opinion that the United States patent granted to W. M. Burton for manufacturing gasoline and asphalt from fuel oil presents nothing of patentable novelty over the work of Sir Boverton Redwood and the Dewar-Redwood patent.

It is claimed by the Standard Oil Co. of Indiana that its patent attorneys, who prepared and prosecuted the applications for the Burton patents, fully acquainted themselves before filing them, with the prior art including the Dewar-Redwood patent. It is a significant fact that the examiners in the Patent Office, as shown by the records of the Burton applications, cited and fully considered that patent with reference to them, but found nothing in it anticipatory of the claims made by Burton.

One of the chief differences between the processes as outlined in the Dewar-Redwood patent and that of the Burton patent is, as pointed out by Burton, that in the former, carbonic acid gas, etc., was introduced to produce the pressure for the pressure distillation, whereas in the Burton process such means of pressure production is not made use of. Another point made is that the earlier patent did not consider the production of gasoline as it was not of value, whereas the gasoline substitute is the chief object of Burton's process.

The Standard Oil Co. of Indiana, owns and attaches great value to the Burton patents, and says it will undertake to maintain its rights under them against any infringements.

Municipal Repair Trucks Immune

MILWAUKEE, WIS., May 13—That repair trucks belonging to the fire and police departments have the same privileges on the streets as fire-fighting apparatus or police patrols, was the decision of Judge Halsey in the Circuit Court at Milwaukee in dismissing the damage suit of Rudolph Engel against the city of Milwaukee. Engel was struck by a fire and police alarm system truck as he was boarding a street car and sued for $5,000. The city demurred and Judge Halsey sustained it, saying that the city cannot be held liable for an accident occasioned by a police and fire alarm truck any more than by an accident caused by the fire department.

Fletcher Carbureter No Infringer

CHICAGO, ILL., May 10—The Flechter carbureter, made by L. V. Flechter & Co., of New York City, is no infringement of the Perkins patent No. 731,218, owned by the Stromberg Motor Devices Co. This is the decision rendered by Judge Sanborn in the United States District Court, Northern District of Illinois; the opinion is founded on the statement that the claims are vaguely formulated, that the Perkins carbureter never influenced automobile carbureter design.

No Decision on Victor vs. Mechanics

BUFFALO, N. Y., May 14—*Special Telegram*—Justice Marcus of this city has reserved decision on the motion for change of venue in the case of the Victor Motor Truck Co. vs. the Mechanics Bank of New York City and W. F. McGill. These parties were sued by the truck company to recover the face value of notes totalling $250. It is desired to shift the place of trial from Erie to New York county.

Motor Wagon Co. a Bankrupt

DETROIT, MICH., May 13.—The Motor Wagon Co. filed a voluntary petition in bankruptcy in the United States District Court here on May 12. The Union Trust Co. of this city was made the trustee by Lee E. Joslyn, referee in bankruptcy.

It is probable that this company will be made receiver for the Motor Wagon concern by the court. Nothing definite has yet been decided as to whether the business will be continued under the receivership or sold out immediately.

The concern's filed statement shows its liabilities to be $131,196.83, while the assets are set at $85,339.75. This includes stock on hand, machinery, buildings and other equipment.

Railroads Demand 5 Per Cent Increase

WASHINGTON, D. C., May 12—While members of the Interstate Commerce Commission do not know anything, officially, about the proposed railroads freight rate increase, it is being consistently rumored that the railroads of the East will demand an increase of 5 per cent. of the present freight rates. At present first-class freight between New York and Chicago is 75 cents per 100 pounds, and if a 5 per cent. increase were granted by the Commission, this rate would be increased to 75¾ cents.

A. A. A. to Test Double Taxation

NEW YORK CITY, May 13—The Supreme Court of the United States will be asked to pass upon the constitutionality of the double taxation of automobiles as enforced by many states. It was as a result of the growing inclination on the part of many states to increase the registration tax, while at the same time taxing automobiles as personal property, and thus compelling motorists to pay an unjust proportion of roads construction and maintenance money, that this action was taken at the Baltimore meeting of the executive board of the A. A. A.

From time to time there have accumulated protests from automobilists in various parts of the country against holding them mainly responsible because a greater use of the highways has made necessary improved construction and systematic maintenance.

The double taxation question is the main issue at stake. By double taxation is meant where the motorist pays an annual registration on his car and also a personal property tax. There are at present forty-eight states in the Union and of this number there are but five in which the personal property tax has been set aside and only the annual car registration tax imposed. These states are: New York, Pennsylvania, Iowa, Alabama and Idaho. This means that in practically all of the other forty-three states, and nearly all of them have state laws governing registration, the motorist is discriminated against and pays double taxation on his car, the registration fee and also the personal property tax.

The case which will be carried to the highest court in the land has been adversely passed upon by the New Jersey courts, and it involves both the question of double taxation and discrimination against one class of road users. The subject occupied the thorough attention of the Baltimore meeting, held last week, which had representatives from 10 states, with President Laurens Enos presiding and Ex-Presidents Robert P. Hooper, of Pennsylvania, and L. R. Speare, of Massachusetts, included in the board members present.

The New Brunswick Automobile Association of St. John, N. B., asked the executive board if it would be eligible for membership. A favorable reply has been sent to the Canadian body, and it will undoubtedly result in the growing interchange of visitors across the border.

Aldermen Graft Held Up Taxi Ordinance

NEW YORK CITY, May 12—The Mason-Seaman, as well as the Yellow Taxicab Company, have forwarded to Assistant District Attorney Du Vivier evidence to the extent that many members of the New York Board of Aldermen have been using taxicabs for a long time without paying for them. The Grand Jury is now investigating the situation.

Maxwell Indiana Receiver Paid

INDIANAPOLIS, IND., May 12—After hearing several witnesses and taking the matter under advisement for several days, Judge Joseph Collier of the Superior Court has allowed a fee of $7,500 to Frank E. Smith. The allowance is for Smith's services as ancillary receiver in Indiana for the United States Motor Co.

Western Crops in Promising Condition

MINNEAPOLIS, MINN., May 10—Spring wheat seeding is fully completed in the lower half of the wheat belt and 80 per cent. in the upper. Reports coming in from the Soo line are also very favorable.

The secretary of the Oklahoma Grain Dealers' Association has estimated the state's wheat crop at 30,000,000 bushels. Ohio crops are being placed at 35,000,000 bushels.

Illinois State Aid Sought

Governor Urges Convict Labor— To Number All French Roads

SPRINGFIELD, ILL., May 13—*Special Telegram*—At the meeting of the Illinois State Highway Improvement Association held at Hotel Leland in this city today, Governor Dunne announced that he is strongly in favor of employing convict labor on honor system in building state roads. Up to the present convict labor in Illinois has to an extent, been used indirectly in road construction in that the convicts at Joliet have been used in preparing stone for road purposes which has been sold at the lowest possible rate for construction purposes. The governor tonight held a reception which marked the closing of the annual meeting of this association, which, although little more than a year old, has secured more for good roads in the State of Illinois than any other movement.

The main object of the meeting here today was to urge upon the Legislature the necessity of passing the Tice Good Roads bill, which provides for state aid in road building, the state to furnish one-half and the county the remainder. The state, under the law, will supervise construction and maintenance of the roads. The bill also provides for the use of motor car registration fees for road building.

This bill has been endorsed by over 100 motoring and business men's organizations in the convention here today, all of these organizations being represented by delegates.

The Tice bill is at present before the joint committee of the House and Senate. It is expected it will be reported from committee at once, or before the end of the week at the latest.

President W. G. Edens, and all the other major officers of the association were re-elected.

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French Roads to Be Numbered

PARIS, May 3—France has adopted a reform which has the double advantage of costing the nation nothing and of being invaluable to the tourist. Every highway throughout the land is to be given a name and number, and these denominations are to be immediately painted on all kilometre stones and government road-direction posts. It appears but a slight reform, but in reality it is one of immense importance to automobilists. All the roads in France are divided into classes: national highways, departmental highways, *chemins de grand communication*, etc., and each road bears a number. This classification is made use of by the authorities, who never speak of a highway as the road between Dieppe and Rouen, but as "National Highway No. —." To indicate the position more accurately, they have only got to add "Kilometre stone No. —" or "Hundred metre stone No. —" to make it possible for any person to find a desired spot as easily as he would pick out a numbered house in a numbered street.

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Good Roads Committee of Congress

WASHINGTON, D. C., May 12—*Special Telegram*—Chairman Henry of the Rules Committee of the House of Representatives reintroduced to-day his resolution to create a House committee on roads to handle all legislation relating to the good roads movement. The amended resolution provides that the new committee shall not have appropriative powers.

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Transcontinental Movement Progressing

INDIANAPOLIS, IND., May 12—The present scope of the transcontinental rock highway movement and the Indiana to Pacific automobile tour, which will leave Indianapolis on July 1, both of which ideas were born in this state, are becoming wider each day. Letters from state officials, commercial bodies, Governors of states and private individuals are pouring in each day. Cities on various routes which the tour might travel are making all kinds of preparations for the visitors and are begging that they be allowed to act as hosts.

Throughout the entire West the tour plans have been received with open arms. Every city of any importance has written concerning it, and within the week messages were received from the Governor of California and the chief executives of all the states through which the tour will pass and the San Francisco and many other Chambers of Commerce telling of the preparations of welcome which are being made.

The State of Wyoming, through its Legislature, has sent an invitation to so arrange this midsummer tour to the Pacific Coast that advantage may be taken of the excellent roads of Wyoming. The resolutions were signed by the Speaker of the House, the President of the Senate and approved by Governor Carey. A copy was sent to John Guy Monihan, also of the Premier company of Indianapolis, who conceived and put over the Premier Ocean-to-Ocean tour and to whom is largely responsible the development of across country automobile literature and the tremendously increasing number of private motor car owners who see the great vacation possibilities of the now famous trail to the sunset.

The Governor of Nevada has advised that he with his official staff, will meet the tour and accompany it to the California state line, where the Governor of the latter state and his staff will welcome the party, and all will accompany the tourists to the Golden Gate.

Various communities are ready to repair the roads which the tourists will travel, and it is known definitely that the $218,000 which will be spent on the transcontinental highways can be attributed directly to the Indiana tour and assures the American public another means of reaching the coming great Panama Exposition in San Francisco in 1915.

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Colorado Roads Get $200,000

DENVER, COLO., May 9—The new state highway commissioner and advisory board held their second meeting this week and planned an apportionment of $200,000 more among the several counties for road building this year. This makes a total of $518,000 furnished from the state road fund thus far to aid the counties in this year's work of improving the principal highways in Colorado. In nearly all cases the counties will be required to put up as much as the state offers, in order to get the help from the state fund.

The highway commission has also ruled that every county must secure and present a clear title to the roads to be improved, and also have the work planned and supervised by a civil engineer.

This new apportionment makes special provision for improving roads over five or six mountain passes, as well as for putting into good condition several long stretches of important lines of travel.

The first improvement work is planned largely for the benefit of motorists wishing to cross the state, and will take in many pieces of road through Colorado's most attractive scenery.

—

H. O. Smith Heads Hoosier Makes

INDIANAPOLIS, IND., May 12—The resignation of C. B. Warren, president of the Indiana Automobile Manufacturers' Association, has been accepted by the board of directors, and H. O. Smith, of Indianapolis, president of the Premier Motor Mfg. Co. Carl G. Fisher, of the Prest-O-Lite Co., was chosen as a member of the board of directors, and R. P. Henderson, builder of Henderson cars, was selected as tour treasurer.

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Wisconsin Makers Dislike Compensation

MILWAUKEE, WIS., May 13—Wisconsin manufacturers, among whom there are many identified with the motor car industry, are protesting vigorously against the passage of amendments to the Wisconsin Workmen's Compensation law, or industrial insurance act.

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Bad Eggs Among Milwaukee Roads

MILWAUKEE, WIS., May 13—Nearly 1 of the 9 miles of concrete highway built in Milwaukee County during 1912 must be replaced because of incompetent inspection during construction. The mile of poor paving is distributed over 3 of the 5 stretches of county highway improved last year. County Highway Commissioner H. J. Kuelling takes the blame for the mistake and says that the poor paving was due to unwise selection of gravel, which may cost the county $75,000 to $90,000.

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Hudson-Catskill Starts with Seventeen

NEW YORK CITY, May 14.—The West Hudson & Catskill reliability hill-climbing and fuel test started here at noon today with seventeen participants. The cars were entered by members of the New York trade. The night stop will be made at Newburgh, N. Y., where a smoker will be held and the tourists will be addressed by various speakers. They are to return to this city tomorrow night.

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L. I. A. C. Will Have Century Run

BROOKLYN, N. Y., May 13—The L. I. A. C. has announced that it will hold a 100-mile run on May 18. This run will be a non-stop, fixed-time event, held under the A. A. A. rules. The average pace will be 20 miles an hour, and cars will be checked at five points, being penalized 1 point for a deviation of 15 seconds from the speed scheduled.

The Automobile

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Proportioning Motor to Load

OFFICIAL tests of the *Washington Post* motor-truck demonstration published in this issue bring out forcibly the marked differences of cost per ton-mile with different makes of trucks. The reports show where the ton-mile cost is quite often double that of other makes of trucks and there are a few cases where one truck has nearly three times as great a ton-mile cost as another make. The lowest ton-mile cost was with the truck carrying the heaviest load and generally speaking the ton-mile cost increased in proportion as the amount of useful load was reduced; thus a 3000-pound truck showed a lower ton-mile cost than a 2000-pound vehicle, and a 2000-pound truck lower cost than one with a load capacity of 1000 or 1500 pounds.

The only conclusion to be arrived at is that there yet remains much to be done in proportioning the motor size to the load to be carried. This is particularly true in small-capacity delivery wagons where the motor capacity is often twice or perhaps three times too great for the actual work to be done. Such ill-proportion of work to power is poor engineering, but it is generally to be found in vehicles where a motor from a passenger car has been fitted in the chassis for delivery work. Generally with such a vehicle there is a speed nearly as great as in a touring car. On the other hand builders of high-capacity trucks have generally set out to develop a motor for those particular conditions.

Simplifying the Gearshift

THE electrical gearchanging attachment and also the mechanical device for the same purpose give promise of being factors of more or less consideration in the 1914 models. One car-building concern announced some weeks ago that it had tried out and conclusively convinced itself that the changing of speeds by electric means instead of the side lever or the pedal was a big improvement and particularly so with city travel. This concern uses a relatively small motor, one in which it is necessary to change gears much oftener than with a high-powered car. One or two other concerns are now contemplating attaching mechanical gearchanging arrangements which will entirely eliminate work so far as the driver is concerned other than pressing of a button on the steering wheel.

It is doubtful exactly where the electrical and mechanical gearchanging apparatus originated; perhaps the self-starter, the self-lighter for acetylene headlights and the press button for electric lights impressed the inventor with the one thought of eliminating labor to the greatest possible extent and make car driving as great a luxury as possible so far as the driver's work is concerned. It is quite true that the electrical or mechanical gearshift will be welcomed by women drivers, many of whom have discovered how tiring the constant shifting of gears is, particularly when some of the garments interfere with the free movement of the body as needed for gearchanging on some cars. To such the new devices will be a friend in need and leverless gearshifting combined with selfstarting, demountable rims or wheels and simplified lighting should bring the automobile nearly as close as possible to simplified control.

There is yet one other respect in which the electrical and mechanical gearchanging devices can prove their worth, namely, in that their installation will tend towards more frequent gearchanging. For 7 or 8 years there has been developed a strong sentiment against gearshifting, a sentiment that considered gearshifting a weakness in the car or lack of expertness with the driver. The very fact that the body movement connected with lever gearchanging has been eliminated will be an incentive to the driver to change more frequently.

Horsepower is gradually being reduced. Last year saw a general reduction as compared with 1911, this year witnessed a reduction over 1912. Next season will see the power go still lower. With reduction in horsepower and the using of smaller motors there will be increased necessity for greater gearchanging. The four-speed gearbox will come into more general use as it has in Europe. With the advent of such a regime it is highly important that the work of gearchanging be reduced to the minimum; and if the electrical or the mechanical change device can be installed to give uniform satisfaction and the cost of installation is not out of proportion with the results received, then it is a certainty that such devices will come in for practically as general use as the self-starter of today. The rational will always win out and simplifying gearchanging is a rational step. Hundreds of drivers are unable to change gears without that disagreeable grating noise of the teeth of one gear grinding against those of another when engaging.

Felix Nazzaro Wins Targa Florio Race

PARIS, May 13—(*Special cable*)—Clipping more than four hours from last year's time, Felix Nazzaro in a Nazzaro car won the Targa Florio 2-day race round the island of Sicily, covering the 620-mile course in 19 hours 28 minutes 40 seconds. The race started on Sunday, the first stage of 370 miles ending at Girgente, being entirely over mountain roads, including some very steep gradients.

Thirty-five cars started, including two Fords, a Studebaker and an Overland. At midnight Marsaglia on his Aquila was given second start round the island to Palermo, others going at short intervals. At an early hour a stone broke Marsaglia's headlight, giving Nazzaro, who had started half an hour later, a chance to creep up. Snipe, last year's winner, was unable to finish the race. Numerous accidents happened to machines but no personal injuries are recorded. Eleven cars finished within the 24-hour time limit. The results are as follows:

No.	Driver	Car	Time
1	Nazzaro	Nazzaro	19:28:40
2	Marsaglia	Aquilla	20:43:49
3	Gloria	Devecchi	21:48:04
4	Berra	DeDion 8-cyl.	22:22:55
5	Giordano	Fiat	22:26:04
6	Sivocci	Devecchi	22:47:00
7	Lopez	Overland	23:12:47
8	Bordino	Lancia	23:43:45
9	Diana	Isotta	23:46:00
10	Stabile	Minerva	23:59:04
11	Turner	Renault	24:30:00

At the end of the first day Marsaglia had a lead over Nazzaro, Bordino, Giordino. The Overland, driven by Lopez, was the only American car among the sixteen finishers.

Only Two Events at Elgin

CHICAGO, May 10—The Chicago Automobile Club and the Elgin Automobile Road Race Association entered into a formal contract last night which insures the promotion of the annual Elgin road races on August 29-30. The prize list has been definitely set and the card arranged.

There will be only two races this year, as against five in 1912. The promoters have come to the conclusion that better results may be obtained by having one race each day and making each a star attraction.

Therefore, this year at Elgin the first day's race will be as important as will the second day's, although the sizes will be different. The same money will be hung up in each and the distances will be the same—306 miles. In each race the prize money will total $2,500, and in addition there will be a $200 cash prize for the fastest lap in each race. On the first day this speed bonus will be given by Ira M. Cobe, former president of the Chicago Automobile Club, and on the second day the money will be hung up by Referee David Beecroft.

The first day's race will be for cars of a piston displacement of 300 inches and under, and the trophy will be known as the Chicago Automobile Club cup. It is the old Cobe trophy given a new name. The Cobe cup, it will be remembered, first was contested for in 1909 at Crown Point, Ind., at the meet promoted by the Chicago Automobile Club and was won by Louis Chevrolet in a Buick. The next year it was contested for on the Indianapolis speedway and was won by Joe Dawson in a Marmon. Since then it has been out of competition.

On the second day the race will be for cars 450 inches and under, and besides the $2,500 in cash the Elgin National trophy will be the consideration. This famous cup has been run for three times. It was won first in 1910 by Ralph Mulford in a Lozier; in 1911 by Len Zengel in a National, and in 1912 by Ralph de Palma in a Mercedes.

Thirty-one for Cyclecar Grand Prix

PARIS, May 3.—Entries have just closed for the cyclecar and motorcycle races which will form the second day's program of the French Grand Prix at Amiens. There are thirty-one machines in the cyclecar class, thirteen of these being of English origin, one à German, and the rest French. The cyclecar race will be run on the afternoon of July 13, the course being a triangular one and a portion of that employed on the previous days for the big cars. Under the racing rules a cyclecar is a four-wheel machine having a cylinder capacity of not more than 1,100 cubic centimeters, weighing not under 385 pounds and not more than 661 pounds. If the body is entirely detachable, the maximum weight may be 171 pounds. Each machine must carry two persons.

PARIS, May 3—According to an official announcement from Turin, Felix Nazzaro has signed an agreement to race with one of the Itala rotary-valve cars in the French Grand Prix at Amiens on July 12. Unable to prepare one of his own cars for the French race, he has offered to steer an Itala for the Itala company. It is believed that a second car from this factory will be handled by Cagno, the winner of the first Targa Florio race. Among the well-known race drivers booked for the French Grand Prix are Georges Boillot, Coux and Zuccarelli for Peugeot; Albert Guyot and Bablot for Delage; Christiæns and Arthur Duray for Excelsior; Gabriel, Champoiseau and Thomas for Schneider; Victor Rigal, Gustave Caillois, Resta and W. Lee Guinness for Sunbeam, and Opel for the Opel car.

NEW YORK CITY, May 13—Theodore Pilette, from Brussels, Belgium, who will drive the Mercedes-Knight car entered by E. C. Patterson, a Chicago sportsman, in the Indianapolis race, arrived on the *George Washington* today with his Belgian Grand Prize racer and will leave at once for Indianapolis, reaching there not later than Saturday. This is Pilette's first visit to America. His Mercedes-Knight car was given a 15-day overhauling in the Mercedes factory previous to shipment and Pilette expects to average close to 90 miles per hour on the Speedway. The motor is a small high-speed type, approximately 4-inch bore by 5.1-inch stroke. It has a piston displacement of approximately 250 cubic inches, and greatly under the maximum of 450 cubic inches permitted in the rules. The car is fitted with Bosch magneto; Mercedes single-jet carbureter, and Rudge-Whitworth demountable wheels. This car uses a double cone clutch, and also the Mercedes double-bevel differential system.

With a gasoline capacity of 35 gallons, Pilette estimates he can travel 720 miles without refilling, so that it should not be necessary for him to stop during the race. He expects that owing to the light weight of the car, approximately 2,000 pounds, and the large size of tires used, he will be able to make the entire distance without a stop.

Pilette's experience as a driver dates to 1904 when he began tricycle racing. In 1906 he drove a 90-horsepower Mercedes in the Ardennes Circuit, but was prevented from finishing by carbureter troubles. He has been in the racing field more or less ever since, although his business as Mercedes agent in Brussels prevents him from following the racing circuit to the same extent that other drivers do.

Cleveland Special for Indianapolis

CLEVELAND, O., May 12—The Cleveland Automobile Club has arranged for the third annual Cleveland Automobile Special Train to run from Cleveland to Indianapolis and back at the occasion of the Memorial Day Indianapolis Sweepstakes.

INDIANAPOLIS, IND., May 12—This week will see most of the drivers who are to participate in the 500-mile race at the Indianapolis Motor Speedway, May 30, at work at the speedway, tuning up the cars. The Stutz cars have been at work for some little time. The Henderson will be on the track before long. Bob Burman and his Keeton are here, as are Billy Liesaw and the specially-built Anel. The Isotta team is expected next week. De Palma and his Mercer probably will be here before the end of the week. Word has been received that the Tulsa, entered by oil promoters of Broken Arrow, Okla., has been shipped and is on its way. Clark, the driver, will be here in a day or two. It is not known when the other cars will arrive, but they are expected momentarily.

A. R. Pardington, referee, was in the city a few days ago and expects to return about May 25 to remain until after the race. Plans for the race are well under way. The advance seat sale is up to expectations and local hotels are planning to entertain the largest number of guests in the history of the speedway.

Isotta Cars on the Way

MILAN, ITALY, May 13—(*Special cable*).—Word has been received that the three Isotta Fraschini 36 racing cars that are coming to compete in the 500-mile race at Indianapolis are on their way and will be shipped from Havre on the Lorraine next Saturday. They are in charge of Vincenzo Trucco who is to drive one of them. It is likely that Dave Lewis, well known as an American driver, will act as a relief man for the Isotta team.

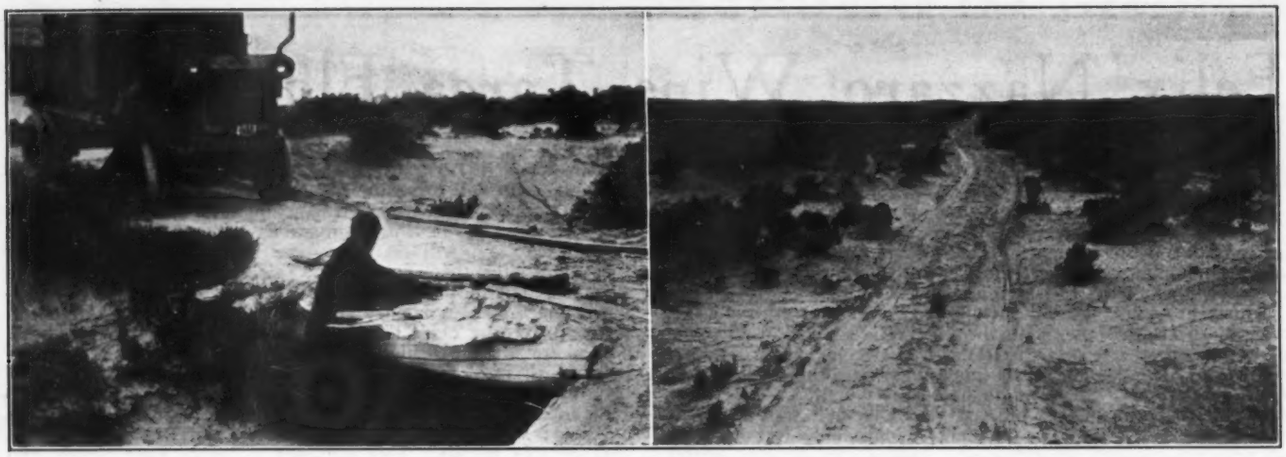
The Indianapolis management has allotted numbers 26, 27 and 28 to the Italian cars. The first number is Harry Grant, the second Tetzlaff's, and the third Trucco. Red and green has been selected as the racing colors in order to get as close to the Italian national cofors as possible.

Tacoma Road Races for July 5-6

TACOMA, WASH., May 8—Three road race events will be held during the Montamara Festo, on July 5 and 6 on the roads of Pierce County. Prizes will be hung up to aggregate $10,500. The first event will be the Inter-City Century run, approximately 100 miles over the 3.5-mile course, the prize being a perpetual challenge trophy and $1,500; the second event is the Golden Potlach Trophy, and a cash prize of $3,500; the third event is for the Montamarathon trophy and $5,500 cash. All three races are for non-stock cars.

Hoosiers Pacific Route Fixed

INDIANAPOLIS, IND., May 13—*Special Telegram*—The Indiana Automobile Manufacturers' Association has adopted the following route for the Indiana-Pacific tour leaving here July 1: National road to Terre Haute, Alton way to St. Louis, Missouri state highway to Kansas City, Golden Belt route to Limon, Colo., Utah link midland trail to Salt Lake City, Nevada branch midland trail through Nevada, thence to Los Angeles via Stockton, Oakland, San Francisco and coast road. The cars will arrive at Los Angeles on August 2. The distance is 3540.1 miles; the cars will return by rail. Ray McNamara, in a Premier, will be the pilot.



Left—A large culvert 10 miles west of Kelton supported on logs having their ends laid directly on the earth. A relic of bygone cattle days when much freighting of supplies was done in horse-drawn vehicles. The top has been protected as it weakened, or broke, by a cushion of earth. Since the photograph was taken it has been replaced with a new structure of present day construction. There are not more than four of such and all are replaced with wooden ones.

Right—A sage brush trail that is largely dependent upon automobile travels to keep its lines defined. There also shows the faint markings of a cross trail occasionally used by sheep camp wagons from some far-away ranch. This trail is to be improved for automobile tourists. This section is 15 miles and is part of a 125-mile improvement.

A Transcontinental Hodge-Podge

By Ernest L. Ferguson

Part IV

Salt Lake City to California

FROM Salt Lake City, the Mormon capital, to the California line is 700 miles. It is customary to look upon the California line as the end of a transcontinental trip because the remaining 300 miles to the Pacific ocean are over boulevard roads, with which the eastern motorist is familiar.

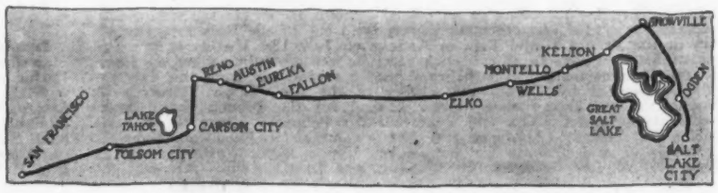
From Salt Lake City to the Nevada-California line, the route roughly divides itself into two divisions: the first one-fifth being through Utah and the remaining four-fifths across Nevada. In looking at the division across Utah, the first one-quarter of it is through a well-settled country; the second quarter crosses a low mountain range; and the last half is foothill country, in which the roads are being improved. In this trip there is a 80-mile stretch between Snowville and Lucin in northern Utah, the country is unsettled, there not being habitation of any nature between these points.

The Nevada section of this trip is over rolling mountain country with a gravelly soil which reaches its mountain climax in the Sierra-Nevadas of the state line. When crossing Nevada you do not encounter any deserts, as desert is understood in the popular conception of the term. It is true that central Nevada has long stretches of country without settlements, the longest of these being 70 miles, between Eureka and Austin, in which not a sign of habitation relieves the eye. The last, or western, third of the state width has settlements all along the roads and the irrigation work is being pushed, so that in summing up Nevada the tourist should bear in mind that the first third of the trip across it is well settled, the middle third without settlement, and the last third well settled.

From the Great Salt Lake to Lake Tahoe on the Nevada-California dividing line the transcontinentalists will find their road comfort is being rapidly improved. Just as to the east and to the west of these two states, there is an awakening appreciation of the value in hav-

Upper—Why one county in Utah is reconstructing a road along the opposite side of the paralleling railroad grade. A series of rains beyond all previous records turned the roadbed into a deep chasm split crosswise by a larger flow of water. The zig-zag lines in the foreground show how alkali mud cracks in baking. Arrows indicate line of old road grade. Circle shows railroad grade.

Lower—Another view, in the opposite direction. On the left can be seen the railroad grade that dammed the rush of water and forced it along the roadway. This railroad grade is now to protect the new roadway to be built to the left of that same grade; this because the shape of the land brings all the water from the right, which is north.



ing tourists go along the way without road difficulties that mar the otherwise pleasant journey.

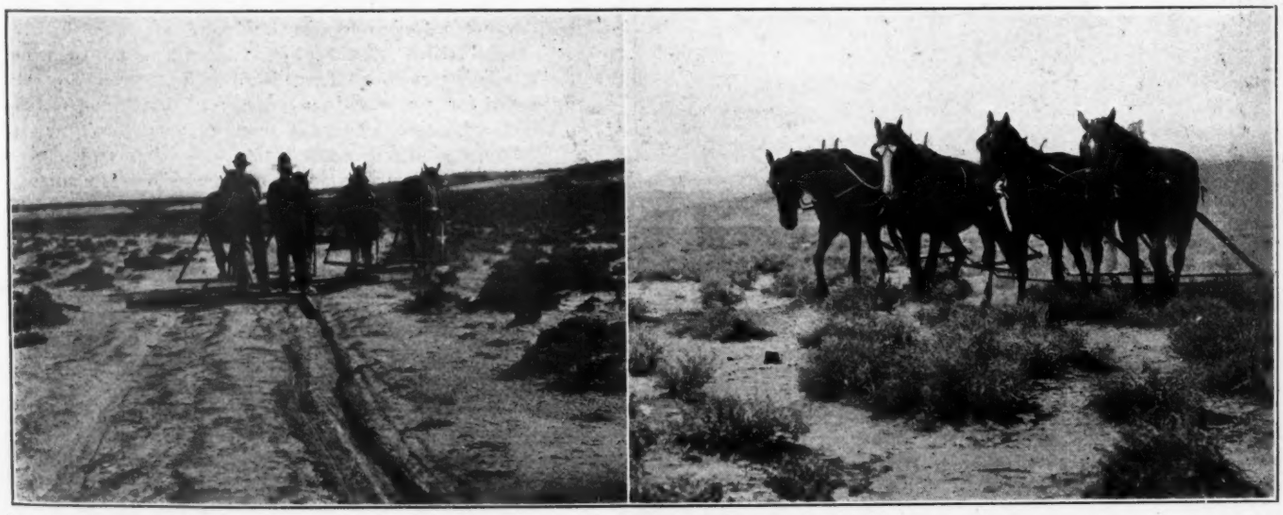
For some distances around Salt Lake City and Ogden, climate and soil are peculiarly adapted to fruit growing and the success and profits are reflected in the many miles of improved roads and highways. These extend in some measure to the eastward, but are more noticeable toward the north along the country bordering the lake.

Heretofore, following the line of the railroad, transcontinental touring has swung north and west around the lake, encountering difficulties in the overflowed flats that extend some miles from the lake, either from weather or the intermittent tidal rise of the lake. Recently a combination of automobile dealers, newspaper men and hotels have devoted much time to find a way that would obviate the previous natural difficulties. The effort has been successful and now automobile travel is directed northwest to nearly the Idaho state line. In distinction this is called the mountain route. By this it is not to be inferred that mountain climbing makes up the work of the car. The route leads through, rather than over, a small range of mountains, and all grades are gradual and of no great length.

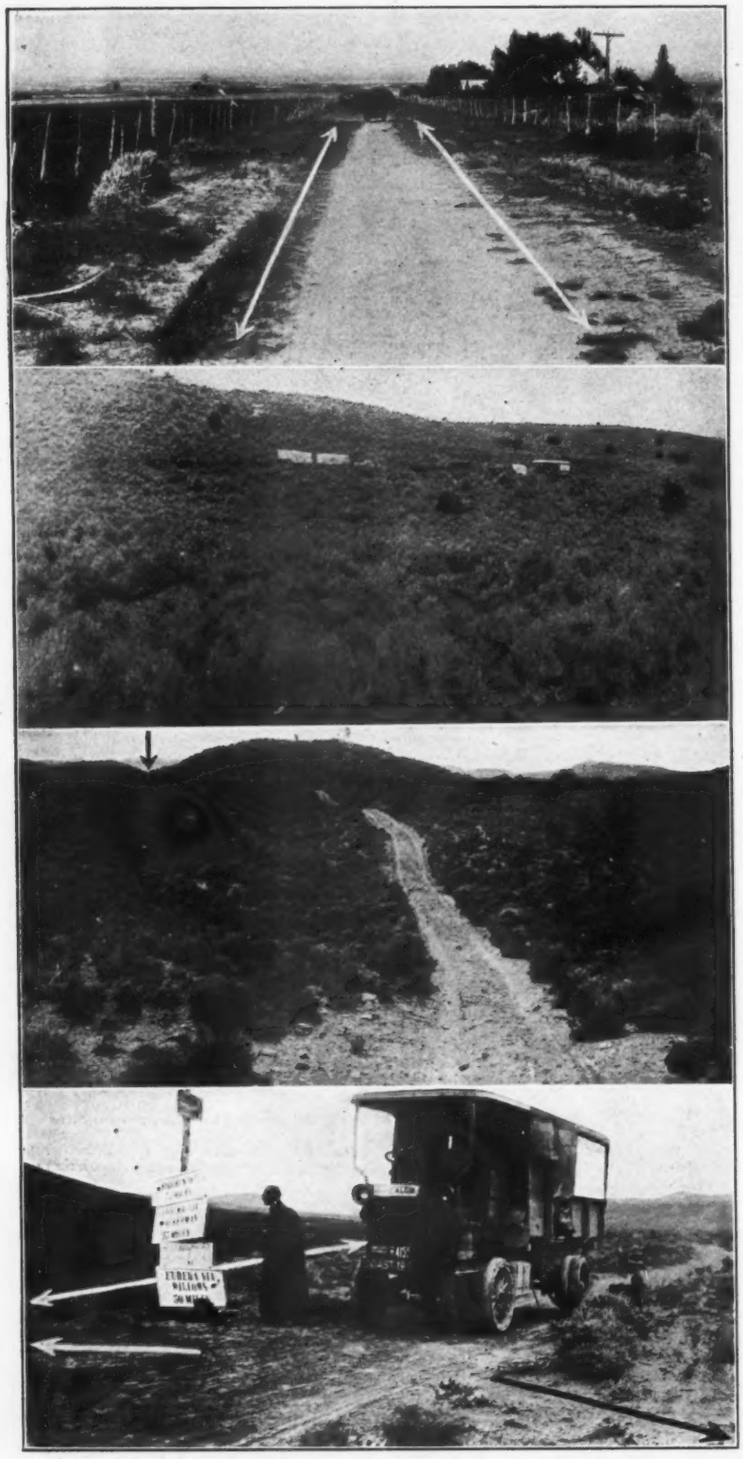
This road has its value in that it is largely surfaced with gravel that has been washed from the mountains for untold ages giving many miles of natural roadbed that is nearly perfect. The thing to be feared is that sometime, in the trend of events, there may come an attempt to construct a highway by tearing up and reshaping the new surface. Bold as the statement is, that would be nearly destruction, as underneath the gravel is that same finely pulverized alkali soil. The most that ought to be done is to provide side drainage for water and snow precipitation, leaving the now excellent surface severely alone.

Just south of the Utah-Idaho line the route turns southwesterly until it comes near the extreme northwest arm of the Great Salt Lake where it bends west to again avoid the flats. Then it runs southwesterly finally coming to the old line of railway used before the cut-off was built across the lake, whence it keeps close to the railroad to the Nevada line. This last section carries it along the northern borders of the Great American Desert, but this is necessary to avoid the precipitous ranges of the Raft river mountains.

Upper—The effects of a long series of cloud bursts in the nearby mountains 19 miles east of Lucin. Arrows show original level.
Lower—The straightaway cross and forking trails 12 miles east of Lucin. The straightaway main trail is the one running lengthwise of the illustration. Arrows show trails and a bank.



Left—Starting the work on the new roadway south of the railroad grade in Northwestern Utah. A steel rail, used either in its normal straight line or else bent into V-shape, is pulled by four horses to tear out the sage brush and other growth. For the first attack a straight rail gives a greater strain. Right—After sage brush has been railed out by its roots to the desired road width, then comes the shaping of the road by crowning for drainage.



Top—A well-kept road in a fertile valley in northwestern Nevada that is irrigated by small streams from nearby mountains. The culverts are narrow—one or two boards wide—and the water shallow, so that upkeep is simple, and a broken culvert does not materially impede travel. At either end of this section are sandy or alkali roads. There is very little rainfall in this section, so that side ditching is not prominent. Arrows show growth wearing away.

Upper Middle—As the tourist turns south toward the middle of Nevada there is a low mountain range to cross. The old road up the mountain has been washed away and the new is yet soft, making the climb slow traveling, particularly after a rainstorm. Horse freighting is slow work, and overtaking automobiles must wait for the one or two turnouts before passing. This scene is 3 miles south of Elco. Arrow indicates road route climbing the Humboldt range.

Lower Middle—Traveling east and west midway the state of Nevada there are stretches of well-defined trails that wind in and out between the low ranges, with now and then a climb to the lowest gap between two crowns. Between Eureka and Austin it is 70 miles and there is nothing but roads such as illustrated.

Bottom—Cross a plain 70 miles between habitations is made a matter of certainty at forking and cross trails by newly painted sign posts erected by the county. It is not unusual to come to groups of six or eight of these signs that are sources of comfort to the strangers not used to magnificent distances. Arrows indicate trails.

This latter portion of the touring road best illustrates the spirit that is alive in the matter of providing roads for the outsider to use. For not less than 125 miles this road is in one county, Box Elder, and recently the county issued road bonds for $175,000 to improve the road up to the Idaho line and then south and west to the Nevada line. The magnitude of this undertaking and the public spirit displayed can be appreciated when it is known that the county has but 14,000 widely scattered inhabitants, and that it is largely a sheep-grazing section—and sheep grazing does not require roads that are graded.

For the last 16 miles an entirely new road line was worked upon during August and September. Heretofore the road in that locality ran north of and alongside the old railroad. This meant that all the wash from the mountains close by on the north swept across the road and, banking against the railroad grade, surged back to the road again, thus doing double destruction. The new road line runs alongside the railroad grade, but south of it. This change was made that the banking of the railroad grade will act as a buffer in rainy weather for the new roadway. Small bridges and culverts have been constructed at logical points, that is, to match those of the railroad.

To Avoid Long Climb

Bending slightly away from the railroad the route now traveled continues by climbing nearly to the top of a mountain, then dips down again to the Utah-Nevada state line. It is part of the county plans to change this line to one that avoids the long climb. To make this change effective it will be necessary for the county across the state line to reconstruct its line of roadway as a continuation. The promise of the county in Nevada has been given the authorities in Utah and work on the change will be carried out during 1913.

Touring across Nevada brings with it several stretches some distances from the railroads. The old trail along with the line of the through railway is not generally used as reports on its character deflects the automobile contingent shortly after entering the state either from the east or the west. However, there is a probable gain to the tourists as the middle half of the trip takes one through several famous mining towns of long standing.

Some Good Roadway

Entering the state from the east there is at first encountered considerable sand and alkali, with later several miles of old railroad grading that furnishes excellent traveling. There is also a long stretch of well-cared-for roadway in a prosperous irrigating section. This irrigation is by many small streams from the nearby snow-clad mountains, and the soil has some gravel in it, also from the mountain sides. This combination tends to give good roads with the least effort which are not affected by the irrigation system, as is the case on the plains east of the Rocky Mountains, where the water is carried in large volumes through great main channels and with soil that is alkali almost throughout.

Soon after entering the state from the east the route turns south to nearly the middle of the state and then turns in an almost direct westerly direction. It is after this latter turning that are the fairly long distances between railroad points.

For the greater portion of this section the natural structure of the soil gives excellent traveling. It is generally a gravelly surface due to centuries of washings from the nearby mountain sides. Like the similar section referred to in Utah, as a touring roadway this

would be spoiled by the average method of improving. Rain, in quantity, is abnormal, and the most that ought to be done is to side-ditch the traveled way to prevent the cross-flowing of water.

The erection of guide posts by the counties is quickly taking place, and it is impressive to find them at the forks and crossing trails where towns or settlements of any sort are 70 miles apart. Those counties that are placing sign posts are also improving the mountain climbs by grading, also by widening the turns on the grades, that have in the past been none too easy to negotiate with the long wheelbase which is characteristic of so many of the automobiles designed in America during the past few years.

After three-fourths of the state has been traversed the towns become fairly frequent and near together. The industry of farming is rapidly settling a considerable section and the spirit to improve the roads for intercommunication is evident on all sides.

A Parting of the Ways

When the automobile transcontinentalist has come to Nevada's metropolis, at Reno, there again occurs a parting of the ways that must be chosen before starting for the nearby California state line. Probably the majority decide for the route running nearly west from Reno that takes them through the famous sheds west of Truckee that protect the railroad tracks from snow-slides.

The chief objection to this route by those who have tried this and the other, told below, is the necessity of passing at right angles with their length, through these sheds at the crossings of the railroad tracks. These passages are at sharp inclines and without the possibility of a turn-out from any cause. The sheds completely hide the trains and those who are most familiar with the "blind" conditions send ahead someone of the party to see that a train is not coming through the sheds.

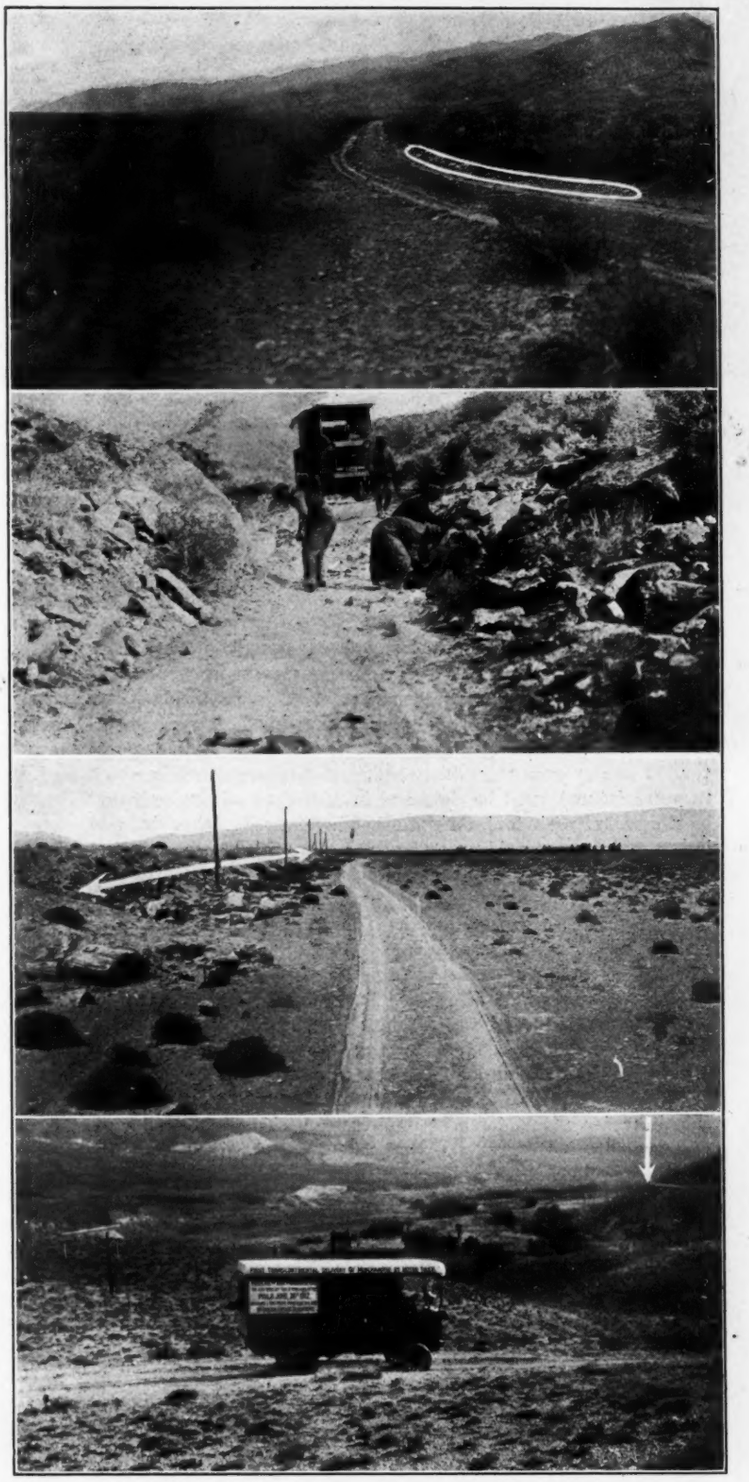
Largely from the lack of information to be secured in the east the other route going south through Carson City is not so well known. Information regarding it is gradually spreading and there is an ever-increasing number who are using it to avoid the snow-shed crossings. Time only will determine which will become the most used route, depending largely on the activity of those most to be benefited in the Capital City. Both routes come together again at Sacramento.

Over the Sierra Nevada

A modern, newly built highway extends south from Reno and is soon to be completed to Carson City. From then on the route is somewhat southwest and crosses the Sierra Nevada Mountains. Coming down from the divide the west state line is crossed at Lake Tahoe. This lake, of over 1,800 feet in depth and more than 6,000 feet above sea level, is thickly dotted with hotels along its boundaries of more than 23 miles in length and 13 miles in width and furnishes pleasant variation in scenery.

By either route climbing the Sierras commences just before crossing the state line into California. That by Truckee is perhaps less in distance, but has sharper grades for short distances. Via Carson City the climb commences in town, and is several miles long, but is quite well graded with few, if any, severe pitches. In either instance the climb is the greatest one encountered in going from the Atlantic to the Pacific, and both present views that are magnificent beyond description.

(*Concluded.*)



Top—Not all sage brush country has clear alkali soil. Now and then there are some stretches with rock in them that give good going. One soon learns to tell in advance the character of the road bed by looking ahead and noting the shade of the sage growth. These shades vary from a dark green to a green that is hardly more than a delicate tint. The deep and light green sage indicates a rather heavy alkali; the medium green a gravelly soil. Area marked in white is covered with stones.

Upper Middle—A particularly narrow canyon that passes the tourist through the Desatoya range of mountains into a valley that was on the old pony expresse route. It is west of Austin and the canyon is 4 or 5 miles long.

Lower Middle—Just naturally good automobiling over a gravelly surface with some rock in the subsoil approaching Wadsworth, Nev. A vast area in western Nevada has been recently opened to irrigation settlement, and where not cut up by the iron tires or horse vehicles the surface gives fair to excellent going. Otherwise, it is deep in sand and alkali. On the left is the retaining bank of a large irrigation main channel. Arrow indicates earth retaining walls.

Bottom—Nearing Reno the roadway, to keep out of the low, wet valley, winds along a bench about half way up the side of the mountains. It frequently makes sudden and sharp ascents and descents with hairpin turns that require good driving ability and brakes in the best condition. Arrow shows where road runs around a "nose" of the mountain.

The Engineering Digest

A Digest of Technical Information from the Engineering Journals

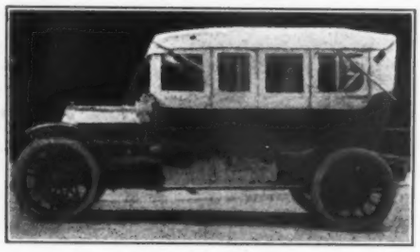


Fig. 1—Top with cellon windows

How Non-Inflammable Celluloid Is Actually Used for Automobiles and Aeroplanes—According to statements from body builders, glass and ordinary celluloid are still the materials used, and the only ones commercially obtainable in this country, for all those purposes in automobile construction for which a transparent sheet is required. Glass panes must be thick in order to minimize the danger of breaking them and wounding those near them with the splinters, and for the same reason the vehicle body, or other structure in which they are framed, must be rigid and heavier than otherwise would be necessary. Celluloid, on the other hand, easily takes fire and burns with great rapidity, and with a shooting flame which is likely to ignite adjacent parts. Naturally its use is limited to safe locations and to the smallest possible areas by which the purpose in view can be ostensibly served. These materials therefore impose a considerable restraint upon the builder's ingenuity, especially in the matter of providing closed vehicles of a very light type, tops which will afford both protection and an unrestricted view of the landscape in rainy weather and windshields which will be neither too heavy nor too delicate and fragile. The accompanying illustration, Fig. 1, shows something of the effect which can be obtained when a tough and non-inflammable substitute for celluloid can be used instead of the ordinary kind. It represents a German Daimler car equipped with a summer top with flexible cellon windows of generous size and number.

With regard to cellon and some of its other recent applications, Dr. A. Rost gives some timely information in *Kunststoffe*, and this journal at the same time sends out a sample of the material, from an examination of which it appears that cellon is slightly less uniform in texture and transparency than first-class nitro-celluloid, and that it burns slowly when a flame is held to it but does not sustain a flame. It shows traces of unsolved cotton fibre at the edge where a portion is torn off. It is softer, tougher and more pliable than a celluloid film. These characteristics may account for the fact that no legislative steps have been taken to make its use for motion-picture films compulsory, in spite of the fire risk encountered with nitro-celluloid films. Another reason may be found in the fact that the cellon material is made by a process patented to Dr. Eichengrün and practically is the basis of a monopoly, so long as other incombustible, or rather uninflammable, celluloid substitutes cannot be produced industrially at a competing price. It is made by a single concern located in Cologne.

Dr. Rost calls attention to the experience that artificial substances which originally are produced in imitation of a natural material, or of one which has been in the market for a long time, rarely get into the competition intended but find their employment in new fields, just because they vary more or less from their prototypes, falling short at some points and excelling them at others. Although Germany, for example, produces more than 10,000 kilograms of artificial silk per day, scarcely a single garment, not even a veil, is probably made from artificial silk alone today. The silk worm culture continues unabated. Galalith, which was intended as a substitute for horn and was made and marketed at first with that purpose in view, has gained its field as a substitute for ivory, ivory nut, wood, onyx and marble. Bakelit was meant to replace copal lacquers and amber but is actually used for cane and umbrella handles and extensively for buttons. Cellon, similarly, does not now seem to threaten celluloid as a material for the numerous household and toilet articles made from this substance but is opening up new avenues for itself in connection with automobiles, motor boats and aeroplanes, in which lines celluloid of necessity has played a very modest part. The possibility of having numerous, large, light and pliable areas of completely transparent material for vehicle tops, boats, awnings, tents and aeroplane bodies, without running the risk of having the entire equipment consumed as the result of a trifling accident with a match or a cigar, has struck a very receptive mood where new effects and conveniences relating to transportation by motor are studied.

Rain curtains hung at the side of the chauffeur and arranged to be rolled up or down, in either case leaving a clear view to the sides, have been found practicable, and for taxicabs and mail wagons strong sheets, from 1 1-2 to 2 millimeters thick, offer a substitute for glass planes which is appreciated not only because the glass is so frequently broken in this class of vehicles but also because the cellon panes can be made larger. Aside from the avoidance of fire risk, they have the advantage over celluloid windows that they do not turn yellow from the effect of sunlight and, being more leathery in structure, the material can be sewed to textiles without difficulties and can be rolled, folded and bent almost like woven goods. It is however in the aeronautic industry that cellon has taken a place for which no other material can even come into the question. Count Zeppelin showed the way in this respect. Cabin windows and windshields for the gondolas of the big airships came first, but the cellon was soon also used as material for side walls and bottoms of gondolas, being strong enough, in the right dimensions, and lighter than aluminum. Its employment in aeroplanes has been of similar nature, and, going further, Professor Reissner in Aix-les-Bains tried in 1910 to use the material exclusively for the frames and membranes of the planes, in an effort to make the whole machine practically invisible at a moderate altitude, and the military aeronautic corps in several countries have carried on experiments with the same object in view. But the results obtained have not as yet been decisive, for cellon is after all only a plastic material, and the toughness it possesses is comparative; its tensile strength is not as high or reliable as that of a fibrous or metallic texture.

By far the most important application of the cellon substance in the art of building aeronautic craft has been found by using the material in solution as a varnish or lacquer for air proofing and waterproofing the silk or canvas employed for the balloon and aeroplane surfaces. Indifferent to castor oil, gasoline and atmospheric influences, including sunlight, as well as to grease, oil and soap, and so perfectly smooth as to reduce air resistance materially, the cellon varnish has had much to do with the im-

provements recorded in the durability and speed of aircraft. It has been shown that an impregnation with rubber leaves the tensile strength of canvas or muslin practically what it was before and that linseed oil reduces it about 10 per cent., while sizing with starch has a more complicated deleterious influence causing the material to rip readily where a rent is started, and, on the other hand, the aero-technician Dr. Quittner has found by tests that the lacquers produced on the same chemical basis as cellon increase the tensile strength of the textiles a clear 50 per cent. and reduce skin friction about 20 per cent.

These developments in the aeronautic field, to which Dr. Rost refers with more detail, have served to demonstrate the properties of the material for the benefit of the automobile industry, so that it may be tried out in those applications for which it may be considered suitable without the misgivings usually entertained with regard to merely commercial recommendations. Some special uses of the cellon lacquer, as a coating and preservative which may be removed bodily when this is desired, are related by Dr. Rathgen in *Zeitschrift für Museumskunde* for January and have reference to the results obtained by the directors of the royal museums in Berlin. It seems possible that this application may be of interest for the conservation of patterns and gauges made to a high standard of accuracy.—From *Kunststoffe*, April 15.

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ADAPTING Spring Suspension to Varying Loads.—The knotty problem of devising a spring suspension which will serve equally well for underloads, normal loads and overloads is receiving considerable attention in Europe, especially since the trade in commercial vehicles has grown to respectable proportions. So far no radical solutions are offered, and the palliatives which have been devised have not sufficient scope in their action to span the difference in requirements between an empty and an overloaded delivery wagon or truck. The efforts run in two directions. Either the springs fitted to the vehicle are purposely made so strong or stiff as to support the maximum load or shock, and the loads between minimum and maximum are supported upon auxiliary shackle-springs which must be mounted at an initial tension equal to the minimum load (though this is not always observed), or springs of sufficient flexibility to afford comfort and protection under normal conditions are supplemented with shock absorbers which limit and retard oscillations, under abnormally severe conditions, especially the violent recoil which, without them, the main leaves alone would be called upon to resist. The first system requires shock absorbers, anyway, in order to take care of unusually severe shocks sustained with maximum load, and shock absorbers alone give no static support for overloads and therefore have a reduced range of action under overload conditions. In brief, auxiliaries are for stiff springs, and shock-absorbers are for flexible springs.

One of the latest devices designed to supply something better belongs in the first class and is shown in section in Fig. 2. It is called the M. S. shock absorber but is an auxiliary and adjustable air-spring. The lower cylinder is hung from the upper bolt which is journaled in the end of the leaf spring. The upper cylinder, which works as a piston in the lower, is hung from the lower bolt which is secured to the vehicle frame or the C-spring extending from it. The interior space between them is filled with air whose tension may be regulated to correspond to the load by means of inflation at the air valve V. The bearings between them are so safeguarded with packings and pressed leather bushings M, M that no air can escape from the inside to the atmosphere. Between them there is a small annular chamber C, however, and it is stated that air enters this chamber from the outside through the upper leather bushing when the piston is moved downward by shock or load, the air in C being rarefied by this movement, so as to cause suction. On the other hand, when the spring coil causes the piston to move up again, the air which has thus entered C brakes the recoil movement. It is not stated how the additional air in C gets out again in time to receive the next shock under the same conditions as obtained for the first one, but it seems to be assumed that there is sufficient leakage for this purpose through the upper leather bearing, while the lower one remains tight under all conditions. It is the idea set forth that a few strokes with an air pump will fit this device for increased loads, but it is evident that the mechanism ceases to operate as an auxiliary spring and recoil check when the tension of the air becomes equal to the tension of the leaf spring to which it is fitted. The lateral rigidity of the mechanism seems to be amply secured, so as to obviate rolling of the vehicle-body and irregular wear and action of the two cylinders.—From description in *La Vie Automobile*, April 26.

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MASS-PRODUCTION the Source of Perfected Construction.—In an explanation to the general public of the methods by which low price and high quality can be combined in the manufacture of automobiles, Dr. Riedler of Berlin, whose works on the scientific valuation of automobiles have won great renown, succeeds in sketching up a very comprehensive subject in a few illustrated pages, which the layman after all will find it very difficult to understand, since he has no key which will unlock the true meaning of the general term necessarily used in the explanation. But apart from the leading part which personal ability plays in constantly devising new means for reducing cost and enhancing quality in the manufacture of motor vehicles —as demonstrated in all the producing countries but to which the author does not refer—the word picture given by Dr. Riedler comes perhaps as near to representing the facts as any other ever drawn. An attempt is here made to represent the gist of his remarks on a 10 to 1 scale of reduction.

A certain degree of standardization is indispensable as well as a reduction of variety in types of vehicles. To hold on to superannuated, be they ever so time-honored construction forms, where mass-production is contemplated, is a blunder that brings its own punishment. To standardize what is unripe is worse yet. Decisions on these points are heavily fraught with danger but must be taken.

In the making of parts time and cost must be saved everywhere; accuracy and quality must be enhanced at all points. Rigorous organization, perfected machine tools and numerous jigs are necessary. The basis is the stock of raw materials. Each piece in it must be prepared in advance for the manufacture. High-speed-tool steel and machines powerful enough to utilize it to the full are necessary. The specially built machine tools must cut special shapes as rapidly as the general machines cut or mill the standard shapes and surfaces. Many have thought that automatic tools dispense with intelligent handling and choke down the personality of the workman, and they have received no return for their investment when acting on this theory. It devolves upon the engineer to make the new and special tools call out new and higher abilities in the wokman, making him the boss who will drive the machines in his charge to their best.

After the time-saving comes the accuracy. Tools are used which remain accurate under wear. Not only the machines but also the working process must be perfected with accuracy in view. Only mass-production can afford the expensive innovations required. Main parts must be turned with an accuracy of 1/100 millimeter, and some of them still much closer to gauge, while ordinary shops do not work with

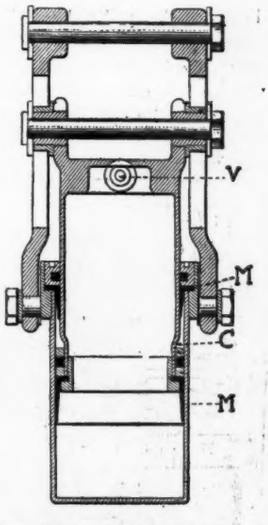

Fig. 2—Auxillary air-spring adaptable to load

more than one tenth of this accuracy and the unskilled workman scarcely knows 1 millimeter in this sence. Every piece must be measured with the so-called tolerance-gauge, which is a pair of fixed calipers, one made accurately to the min' s and the other to the plus tolerance of the piece. If one will pass, the other must stick. There must also be a testing department independent of all other departments in the production. The men here employed measure every piece over again and throw out those that are not strictly interchangeable with all others of the same kind.

Special fitting and after-work is not to be tolerated. In its avoidance lies the reward for the painstaking control of accuracy. The cost of fitting is excessive and incompatible with economy. It also never results in uniform measurements, and the latter are indispensable for establishing a system and stock of spare parts for replacements. For this reason alone no car should be bought nowadays whose parts are not made interchangeable from the start. Inaccurate parts always cause a heavy upkeep cost to the user. Flaws in materials come in the same class and are avoided by continuous testing in the stock department, independently of the tests made at the steel works. These tests should serve economy rather than fancy.

Formerly difficult parts were cast or worked out of a rough-forged piece. Now castings are practically excluded for working parts, as they do not afford the desired weight-reduction nor the full assurance of strength. Forgings are now brought very close to their final shape before machining, to save waste of costly material and work. To this end, a whole series of dies, presses and drop hammers has to be provided, but the bill for materials is reduced to a fraction of what was required by earlier methods. And the enhancement of quality caused by the mechanical working processes now employed goes hand in hand with savings due to the rapidity of these processes.

The main source of silence in the operation of a car lies in the use of automatic grinding machines by which the teeth of gears, after hardening by heat treatment, especially casehardening, are shaped to perfect accuracy, the accuracy of the curved face of the teeth causing not only the silent running of the gears but also reducing wear to a minimum.

Every test of a motor costs several hundreds of marks which can be saved if saving alone is the object, but these tests and similar ones relating to springs, rear axles and gears explain many differences in the prices asked for the best cars and for those not quite so dependable.

Modern automobile construction has become one in all details highly developed specialty. Unperfected empirics and onesided experience are no longer sufficient. The co-operation of science and experience is as necessary as in all other highly developed building of machinery. The manufacturing facilities can however be utilized in different manners: Either for simultaneous perfecting and cost-reduction of the product or for cheapened mass-production alone, the latter being the main aim in too many instances.—From *Automobil-Rundschau*, April 15. [Reprint of article in new German technical cyclopedia.]

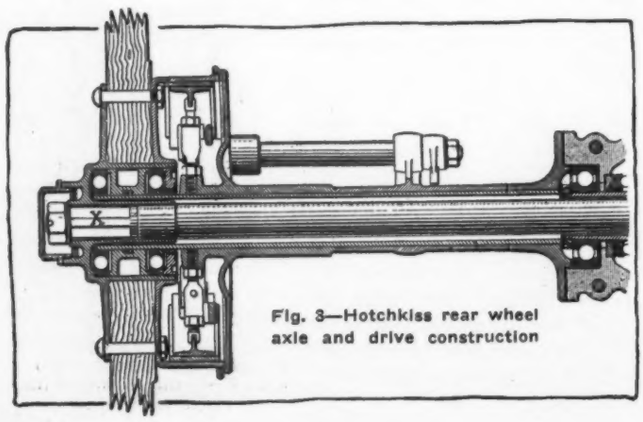

Fig. 3—Hotchkiss rear wheel axle and drive construction

THE Lighting of Shops.—With the different methods of illumination now used in factories, the question of which kind of rays fatigues the workman's eyes most has come to the surface. Many persons believe that the ultraviolet rays are as dangerous as Roentgen rays, especially since it has been proved that they can be used to sterilize water. In reality there is a marked difference, since the Roentgen rays pierce many solids, such as wood and the human body, while ultraviolet rays have only a superficial effect and are absorbed in opaque substances and even in some transparent ones, notably in common glass. The mercury arc lamp emits ultraviolet rays if the tube is made of quartz, and to avoid all danger it is considered advisable in that case to place a glass screen between the tubes and the workmen. If glass tubes are used this is unnecessary, as the glass holds all the ultraviolet rays inside of their walls. For that matter, with quartz tubes, a distance of a few meters neutralizes the effect of the rays, so that such lamps can be used in lofty places where the lamps are hung high. Recklinghausen relates in *Lumière Electrique*, February 22, some comparative tests he has made of the influence upon the eyes of different kinds of light, measuring the fatigue partly by reading and partly by the so-called blink-test which consists in counting the number of times the eyes are blinked in a given time. The red light proved the most fatiguing, the light from incandescent lamps or Auer jets was less so, and the mercury vapor lamp showed a clear superiority.

The automatic closing and opening of the eyelids and the contraction and expansion of the iris, caused by variations of the quantities of light received, or by variations of its sufficiency for the work on hand (this being the most important element in practice) constitute a serious cause of eye fatigue. In order to reduce it, indirect lighting is used, but this is far from being an ideal solution, because the absence of shadows makes it impossible to see distinctly in a room so lighted. Where accurate work is desired it is found necessary to give the light a direction sufficiently definite for producing visible shadows.—From *Génie Civil*, April 5.

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PROTECTION for Ball-Bearings in Wheel Hubs.—A construction which goes far toward protecting the balls and ball races in driving-wheels against excessive strains and which also serves to prevent oil from reaching the brake in more than negligible quantity, is noticed in an illustration showing the rear-axle mechanism of a 20-30 horsepower Hotchkiss car—one of those which, though built in France, are sold perhaps mostly in England. The most interesting portion is reproduced in Fig. 3 showing the axle end with wheel and brake drum. The hub has a central tubular extension reaching into the interior of the axle-end, fitting loosely therein, and the wheel-shaft has a shoulder fitting snugly in the extension, while its extreme end X is keyed in the outer portion of the same, in the manner customary for floating shafts. The two ball-bearings are also mounted upon the axle-end in the usual manner, separated however by a ring-shaped piece—with a deep groove for lightness and oil—which acts as a reinforcing parallel bearing, having a slightly larger minus-tolerance, apparently, than the ball bearing, so as to come into action only if stresses upon the ball-bearings tend toward the allowable maximum, and subject to no wear except at such moments. The wood wheel is assembled directly upon the hub, in accordance with modern American practice, and the brake drum forms an integral flange of the inner one of the two hub disks, but the inner disk is the loose one, in this case, and comes last in the assembling. The design suggests powerful hydraulic press work rather than forging as the method of production for all pieces save the wheel-shaft.—From *Omnia*, April 26.

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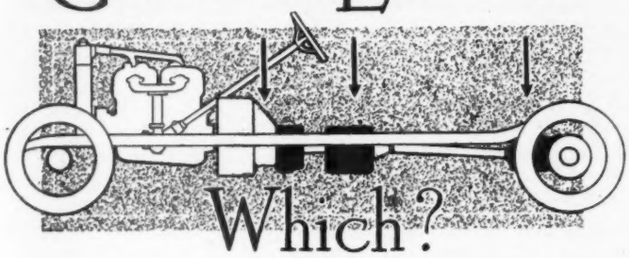
Paving by Motor—Berlin has an 18-horsepower automobile paving machine, the motor propelling the vehicle and also operating six pneumatic hammers which do the work formerly requiring six sturdy workmen, each with a heavy paving ram. Each hammer delivers 90 blows per minute.

The Engineers' Forum

Gearbox Location



Which?

Part III

Unit Construction Favored by Four Engineers; Three Prefer Amidship Location and Two Rear Axle

Riker Prefers Location Amidship
Lacy Likes Unit with the Motor
Amidship Plan Appeals to Dorris
Stutz Finds Rear Axle Satisfactory
Rogers Approves of the Amidship Type
Amidship Is Simplest, Says Schwitzer
Felicke Disagrees with Waldon's Views
Bird Thinks Unit with Motor Is Wisest
McCulla Cites His Racing Experience

THIS week the last instalment of the discussion of gearbox location by the leading automobile engineers of the country appears in THE AUTOMOBILE. This topic has been considered from every possible angle in this and the preceding articles and has excited a great deal of interest in engineering circles. Herewith are appended the opinions of nine well-known authorities in the automobile engineering field:

Amidship Best for Big Cars—Riker

BRIDGEPORT, CONN.—Editor THE AUTOMOBILE—The question of gearbox location has something to do with the size of the powerplant you are putting in your car. I think in a small powerplant you probably could combine your engine and your gearset, or you can, if you like, put your gearset on your rear axle. It seems to me when you put the gearset in a car capable of developing 80 to 100 horsepower it is preferable to distribute your weights instead of concentrating them either at one end or the other, and I think it is a fact that the distribution of weight produces an easier riding car. **The car that will hold the road best at high speed is the old double-chain-drive car,** and the car that has the least dead weight on the rear tires, unsprung weight. I know that this has been the opinion of the engineers in designing racing cars when races were held on the roads, to use a double-chain-drive car for that very reason.

Now it seems to me if you want to approximate these same conditions in the shaft-drive car you have to approximate as nearly as possible the design of the chain-drive car. That means take all the weight off the rear axle you can and distribute your weight as well as you can between your front and rear axles. I myself believe in the separate unit system with the gearbox on the chassis frame, possible because we are building a high-powered car; but it seems to me that is the logical disposition of your weight, and while I admit that it probably is not applicable to the lower-priced cars, because it is a more expensive proposition, yet I feel that **for the large powerful car the separate unit system, with the gearbox on the chassis is preferable to the unit system on the rear axle form.**—A. L. RIKER, Vice-President, Locomobile Co. of America.

Make It Unit with Power Plant—Lacy

ROCHESTER, N. Y.—Editor THE AUTOMOBILE:—I am favorable to making this piece of apparatus a part of the power plant unit. There are, of course, arguments for all three of the locations which are to be found on various cars at the present time, **but it seems most reasonable from the writer's standpoint to put the motor, clutch and gearbox all in the same unit.** It has the particular advantage of compactness, and avoids the necessity for universal joints between clutch and gearbox, thereby reducing mechanical complication and multiplicity of parts.

Universal joints between the clutch and the gearbox are the source of more or less annoyance in the way of looseness which causes objectionable rattles. This unit construction as we have designed it permits of very quick removal of the gearbox as it is carried entirely on an annular row of bolts joining the front end of the gearbox with the rear end of the crankcase, there being no rear support. We have used this construction for something over 3 years, and have found it entirely satisfactory.

I object to axle gearboxes as they increase the amount of dead weight on the tires. The weight is on the tires, of course, regardless of the location of the gearbox, but if carried in the chassis, the shocks due to this weight are transmitted to the axle and tires through the springs, thereby reducing wear and tear on the axle mechanism and tires.

Another very desirable feature of locating the gearbox in the chassis, either on the frame or as a unit with the motor, is in that control lever arrangements may be designed to be attached directly to the gearbox, thus making these parts also a unit with the power plant. My 3 years' experience with this construction is convincing evidence to me that it is a most reasonable arrangement both from the standpoint of the manufacturer and the use of the car.—H. V. E. LACY, Chief Engineer, James Cunningham, Son & Co.

Amidship Preserves Alignment—Dorris

ST. LOUIS, MO.—Editor THE AUTOMOBILE—Regarding the question of the best location of the gearbox, my opinion of this matter is as follows:

Every pound of weight in a rear axle, wheels and other unsprung weight, severs as a direct hammer on the tires. These parts will not yield to road surfaces so freely as a lighter axle. This results in the heavy axle hammering the tires more and the springs less than in the case of the lighter axle which reverses this condition. As the springs are practically free from wear and maintenance cost and the tires the biggest item in the cost of operation, the tires should be favored as much as possible.

A heavy axle also consumes more power to vibrate it over the road surface, hence more gasoline is consumed to do the same work, thus increasing the second largest expense item.

The gearbox placed amidship is an improvement on the rear axle location, as it permits of a lighter rear axle. The

gearbox being carried on the springs also increases the fixed load to live load carried on the springs, improving the easy swing or riding qualities.

The unit powerplant shares the same advantages with the amidship location over the rear axle location and has the following advantages over the amidship location: It eliminates the necessary wear and renewal of universal joints between motor and gearbox. Perfect alignment of crank, clutch and mainshafts can be maintained. It is lighter construction and eliminates necessity for a subframe. It gives a longer propeller shaft and consequently reduces angle friction and wear of universal joints. It is more accessible, being immediately below the front floor.—G. D. Dorris, Vice-President Dorris Motor Car Co.

Rear Axle Location a Success—Stutz

Indianapolis, Ind.—Editor The Automobile:—We are interested in the present discussion whether the gearbox is more suitable on the rear axle or amidship.

From our past experience we have had splendid success with the gearbox located on the rear axle and we attribute the following reason for our success: For instance, if a gearbox were geared 10 to 1 on low speed and you were using a 40-horsepower motor and developing the full amount of horsepower, which would be 40, your driveshaft and knuckle joints would only be transmitting 40 horsepower with the gearbox located on the rear axle, or if the same gearbox were located amidship or on a unit power plant with the motor these poor little knuckle joints and driveshaft would have to transmit ten times 40 horsepower, or 400 horsepower, in order to perform the same function that they would with rear axle gearbox.

The accessibility of a gearbox located on the rear system and the absence of the grind of the gears being transmitted through the body, etc., with a gearbox located amidship. There is no question in the writer's mind but what there is a decided advantage of having a gearbox located on the rear system.

This outfit, if properly designed, is but very little heavier than the ordinary rear system and we wish to go on record that **we are firm believers in a rear axle gearbox and gearbox unit.**—H. W. Stutz, President, Ideal Motor Car Co.

Amidship Is Most Flexible—Rogers

Racine, Wis.—Editor The Automobile:—With reference to the mounting of the gearbox, would say that we favor the central location because it is very flexible, and there are fewer opportunities for misalignment. It is also more accessible than one connected with either the rear axle or the power plant unit. The gearbox control is more simple than the one requird when the gearbox is mounted on the rear axle, and it also gives better distribution of weight.

Another of our objections to mounting the gearbox on the rear axle is that this construction necessitates an abnormally heavy rear axle.—G. V. Rogers, Factory Manager, Mitchell-Lewis Motor Co.

Unit with Motor Is Wisest—Schwitzer

Indianapolis, Ind.—Editor The Automobile—We are building the gearbox as a unit with the motor because we consider it a better proposition from the manufacturing point of view, as well as from the mechanical aspects.

It eliminates universal joints between clutch and gearbox and allows with the simplest means a rigid dust and oil-tight construction for clutch and shifting mechanism without affecting the accessibility with the proper design.

With center control the number of parts for the latter, as joints, rods, etc., is reduced to a minimum, making a great saving in cost and weight as against the arrangement of the gearbox amidship or on the rear axle. It is an easy matter to attach both pedals and levers to the unit, which can be assembled as a whole and hung this way in the chassis an an ideal assembly proposition.

With the gearbox on the rear axle a great deal of weight is carried directly on the tires, while with the unit powerplant it is all suspended on springs and the material probably not so badly subjected to crystallization.

As to weight distribution, we believe, at least with the smaller cars, that the motor unit construction gives a better-balanced machine. The simplicity and cleanliness of design of a chassis with a unit powerplant which has hand and foot control attached to it and is arranged for straight-line drive with only one universal joint necessary is an appealing feature.

It is true that with the gearbox on the rear axle the strains on universal joints are greatly reduced. But as the weights on these parts are not very considerable and as they have small diameters, with an increase of a negligible amount of material it is possible with the unit powerplant to increase strength and bearing surfaces to give services under all contions.—Louis Schwitzer, Engineer, Empire Automobile Co.

Rear Axle a Bad Location—Felicke

Indianapolis, Ind.—Editor The Automobile:—We do not agree with the views expressed by S. D. Waldon in favor of the gearbox axle. We have the following objections to this construction:

First: It increases the unsprung weight of the car. Mr. Waldon states that the Packard gearbox axle is lighter than any other axles without gearbox used on cars of similar weight and power. While this statement reflects great credit upon the designers of the Packard axle, it misses the point entirely, for if an axle is strong enough now with the gearbox it will be strong enough after the gearbox has been removed and the whole weight of the latter must be considered, therefore, as additional dead weight.

That a saving in unsprung weight is of great value is certain. The rear axle is recipient of all the shocks and jolts caused by the unevenness of the road. It is continually thrown up and down and **as the magnitude of the shocks is in direct proportion on the mass of the axle, they will be smaller, the lighter the weight of the axle.** Every unsprung part has to stand the undiminished force of the road shock and it becomes clear that a gearbox axle with about 85 pounds more dead weight than the average axle will be hard on the tires, wheels, bearings, the axle housing and the road.

The reduction of the unsprung weight has long been the aim of automobile designers. Some have gone even so far as to suspend the differential housing on the frame and to transmit the power by two universal joint shafts to the wheels (DeDion-Bouton and Roland-Pilain); others have taken the weight of the springs off the axle and suspended it on the frame (Lanchester, Edwards and King).

Another bad feature of the gearbox axle is that it exposes the power transmitting parts to the sudden shocks caused by the unevenness of the road. When a car is in motion the speed of the power transmitting parts is in a certain relation to the speed of the car. If, now, the rear wheels drop into a hole or go over a bump, they are forced to roll off in a certain time a greater distance than corresponds to the speed of the power transmitting parts. In other words, the latter receive a certain acceleration or shock. When the gearbox is connected with the motor or placed amidship the gearbox gears are protected by the long propeller-shaft and the blow on the rear axle gears is also made ineffective by the backing of the elastic propeller-shaft. If, on the other hand, the gearbox is connected with the axle, there is no elastic part to give and the parts have to stand the full force of the blow. This is the reason why gearbox axles are notoriously hard on gears and shafts.

Of course, all of these forces can be taken care of by increasing the size of the parts, but what has been gained by

carrying the high-speed members back to the axle and using smaller universal joints is more than offset by this.

Besides these, there are many other objections to the transmission axle. The bevel gears cannot be adjusted—the gearbox is very inaccessible when used in connection with the torsion tube, as is frequently done. The floorboards in the tonneau have to be raised to give sufficient clearance, which makes it impossible to get a low car, etc.

For all these reasons we are not in favor of the transmission axle and have adopted the unit power plant construction on our cars.—KARL FELICKE, Chief Engineer, the Motor Car Mfg. Co.

Unit Equalizes Weight Best—Bird

JACKSON, MICH.—Editor THE AUTOMOBILE:—We believe that the unit power plant construction, which incorporates the motor, clutch and gearbox in one housing, is preferable to the practice of carrying the gearbox on the rear axle. **We do not believe it is good policy to put any more weight on the rear axle than is absolutely necessary, because the unsprung weight has such a marked influence on tire wear.** The tire cost is an important factor in the total cost of the upkeep, and we believe that we cannot be too careful in adopting such methods of design as will minimize it.

The gearbox, when incorporated in the unit power plant, is placed in absolute alignment when the motor is assembled, and is never affected by road strains. Any strain which is applied to the power plant affects it as a whole and does not tend to throw the moving parts out of alignment.

We believe that the gearbox control is very much simpler in the case of the unit power plant than with the gearbox on the rear axle, where the shifting rods must be permitted to work freely with the spring action of the car. The unit power plant construction makes the gear-shifting connections shorter and fewer, thus eliminating a great deal of lost motion.

Last but not least, we find that the incorporation of the gearbox with the motor helps to equalize the weight on the front and rear axle. This makes the car ride more easily, and aside from the question of unsprung weight, gives an advantage to the tires.—CHARLES I. BIRD, Engineer, Jackson Automobile Co.

Rear Axle Location in Racing—McCulla

DETROIT, MICH.—Editor THE AUTOMOBILE:—I notice in THE AUTOMOBILE, in the discussions regarding the proper location of the gearbox, that several of your contributors remark that the gearbox is in the best location when it is placed up front, from a racing viewpoint.

I do not quite agree with this, for I have driven a great many high-powered foreign racing cars, both on the road and track, and it is my firm conviction that the proper place for the gearbox is on the rear axle.

If you remember, it was the general consensus of opinion during the 1905 and 1906 Vanderbilt Cup races that the winning Darracq was by far the steadiest car on the road and took the corners with less skidding, etc., than any other car, and with less tire trouble.

It was also remarked during the first 500-Mile-Race at the Speedway that the winning Marmon hung to the track much better than any of the competitors, and with far less tire trouble.

Of course, I fully realize that in the case of the Darracq, the car had no differential; but, then, again, I have never driven a foreign racing car, either chain or shaft driven, that had a differential.

I am not applying any theory whatever to this letter—but it is merely my personal, practical experience.—WM. R. MCCULLA, Assistant Research Engineer, Packard Motor Car Co.

Considerations in Automobile Spring Design

From a Paper Read Before the Society of Automobile Engineers by Leavitt J. Lane

THE ideal automobile spring must fulfill three conditions: first, it must have sufficient resistance and elasticity to support its maximum load without its shape being permanently altered; second, it must be stiff enough to take care of its heaviest work and at the same time be not too unyielding to slight inequalities of the road; and, third, it must decrease the resistance to rolling.

The first consideration in spring design is the steel composition. The ordinary spring steel lacks strength and elasticity and has not the resistance-to-fatigue characteristics of some of the comparatively recent alloy steels. Manganese, nickel, silicon, chromium, vanadium and high carbon steels are used to a greater or less extent, but the best results seem to be given by springs made of alloy steel compositions, such as chromium-vanadium, nickel chromium or silico-manganese. Of these the vanadium alloys are to be preferred. But no matter how good the steel primarily, the secret of the steel spring lies in the end in the heat treatment. A recent comparative table of the physical properties of vanadium and other crucible steels gives the following peculiar properties of vanadium steel. The different steels were oil tempered at 1,500 degrees Fahr. and drawn to 600 degrees Fahr.

	Tensile Strength Pounds per square inch	Elastic Limit Pounds per square inch
Carbon	126,300	101,100
Nickel Chromium	150,300	134,500
Nickel Chromium Vanadium	163,700	152,300
Chromium Vanadium	233,090	210,500

Vanadium steel is practically non-fatiguable and consequently does not become crystallized under the repeated shocks to which a spring is subject. According to one authority, William E. Snow, from one of whose articles the above table was taken, a crucible carbon steel spring was broken at 125,000 alternations of the testing machine, while the chromium vanadium steel spring withstood 5,000,000 alternations and remained unbroken.

In taking up the design of the spring as regards shape, number and thickness of leaves, etc., the use of existing formulas must be regarded as merely a basis for determining just what is required under the known fixed conditions. By experimentation alone can a spring be built most nearly approximating the ideal for its particular case. There are certain fundamental rules which must be followed in all cases, but no formulas can be depended upon to give the best results under the varying conditions of motor car use. A long spring is more limber than a short one. The narrower the spring the more limberness it has. Increase the number of leaves and the stiffness is increased. The more the angle of the spring curvature arc is decreased the stiffer the spring becomes.

In regard to the various types of springs in vogue at the present time, the following table was made up from statistics of recent pleasure car models:

Front springs		Rear spring	
Semi-elliptic	91 per cent.	Three-quartere-lliptic	58 per cent.
Full-elliptic	4 per cent.	Semi-elliptic	19 per cent.
Miscellaneous	5 per cent.	Full-elliptic	8 per cent.
		Three-quarter-platform	10 per cent.
		Miscellaneous	5 per cent.

In commercial car practice there is little uniformity, due probably to the relative recent development of this part of the industry.

Design for Streamline Runabout Body

Body for Edwards-Knight 25 Has Hood and Cowl in Continuous Line—Large Locker Space Provided

By George J. Mercer

A RUNABOUT body design possessing lines that suggest power and speed is shown in the accompanying scale drawings. The chassis to which the suggested design is applied is the Edwards-Knight 25-horsepower model, which has a four-cylinder motor with a bore and stroke of 4 by 5.5 inches, and worm drive. The wheelbase is 120 inches, and wire wheels, 36 by 4.5 inches with Q. D. rims, are fitted. The frame is of the double-drop type which permits the low body position in relation to the hood that is clearly brought out in the side view, Fig. 2.

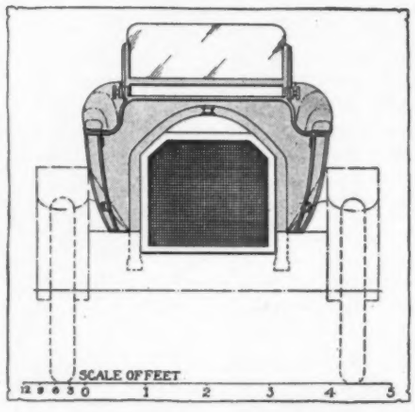


Fig. 1—Front view, showing low position and compact form of body design

It will be seen that the type of body shown adapts well to the chassis, producing a robust and harmonious appearance. The upward slope of the hood permits of the cowl being a continued straight line and the minimum of wind resistance is thus obtained. This effect is also enhanced by the slanted top of the radiator.

The application of wind-cutting surfaces is the keynote of body designing today. Every inch of flat surface eliminated from the front of the car means a considerable saving of power besides having the additional merit of improving the appearance.

The introduction of this feature in body design will be noticed in Fig. 2, and the same idea is carried out in connection with the sides, as shown in the plan, Fig. 3. Flat or obstructing surfaces are avoided by blending the sides of the body into the hood. The body lines are thus continuous in both sides and top, producing a smooth streamline effect.

The sizes of all doors are indicated in the drawings. At the front of the entrance doors there are two good-sized flutings on each side of the body for ventilating, in addition to which there is a ventilating device at the base of the windshield. This ventilator is in the form of a half circle of metal with the ends closed. The lower side is always open, while at the front, there is a door, running the entire length of the opening, that is hinged at the top and is operated by two wing nuts. This door can be opened to any extent desired, and the semi-circular shield serves to deflect the wind under the cowl and away from the faces of the occupants.

This windshield is a new feature used in conjunction with runabouts. The frame that holds the glass extends along the bottom and part way up the sides, the top edge being glass only and free from any obstruction to a clear vision. This windshield as a unit can be swung to any angle, or lowered to lay flat on the cowl. The frame that holds the glass is of wood and is strengthened considerably by the metal that forms the hinge. The ventilating device is integral with the windshield and moves with it.

A commodious locker compartment is provided at the rear. This locker space, the large size of which can be readily noticed by comparison with the pair of suit cases shown in dotted line in Fig. 2, is subdivided, and loading and unloading is by means of three hinged doors, one on the top and one on each side. These doors are made watertight by having copings projecting from the body .25 inch, over which the edges of the doors fit.

Provision is also made for carrying two spare wheels, the body being flattened off at a suitable angle to receive them. The panel on the body at this point is depressed to receive the pro-

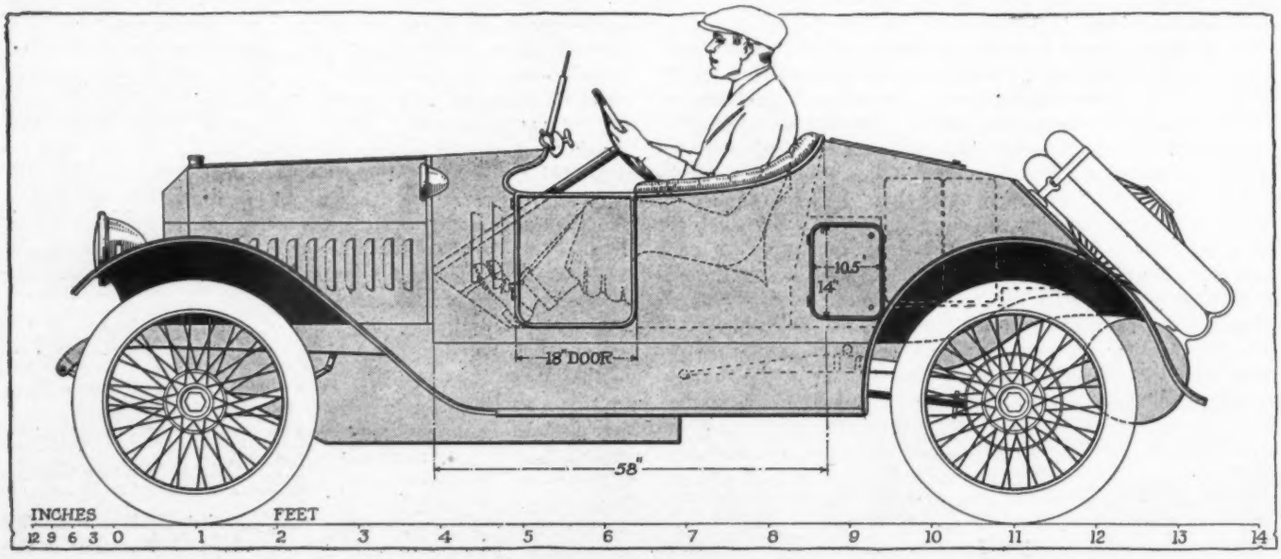


Fig. 2—Side elevation to scale of suggested runabout design adapted to chassis of Edwards-Knight 25

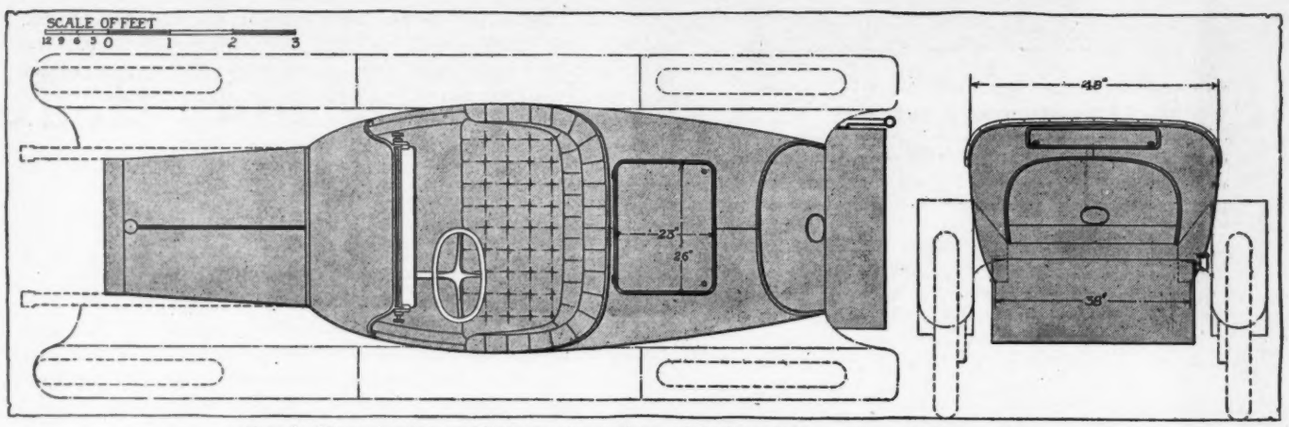


Fig. 3—Plan showing continuous streamlines of body exterior. Fig. 4—Rear view

jecting hub of the wheel. The fastenings are on the gasoline tank and on the body.

For the construction of this body wide sheets of metal are required. The cowl is one piece, forming the two sides and the top and from the dash to the front of the door. The narrow sheet under the door is separate, and is butted between the front and rear sheets. The rear sheet extends from the rear of the door to the back end of the chassis. It is cut off on line with the flat formed for carrying the spare wheels and is then continued up to midway of the top, where it joins the corresponding sheet from the opposite side. This joint is a carefully made butt and the two ends are flush riveted on the outside. On the under side is the customary reinforcing strip that crosses the joint and through which the rivets pass. This joint is not a very long one as the door or lid occupies the greater part of the distance from the seat line to the tire space. After riveting, the joint is carefully wiped with aluminum solder.

The size of the one sheet for the cowl is 74 inches by 18 inches, and for the two rear sheets 70 inches by 53 inches each. All are of aluminum 16 gauge. Aluminum is the most suitable metal for these sheets as considerable hand work is necessary and the extra cost of aluminum over steel is infinitesimal as compared with the added cost of working up steel for the purpose. On the flat sheet at the rear, however, 22 gauge steel can be used to advantage. The joint of this flat sheet with the side panels is covered with a moulding.

On the sides the small doors are cut out of the flat stock, and, as mentioned before, the door openings, both of the side and the top, are reinforced by copings that serve to shut off the entrance of water. The framing inside is of wood, with the necessary iron braces at the entrance doors and under the back end to support the spare wheels. The divisions in the luggage compartment will help in making the top rigid.

This body presents comfortable accommodation for two people, and in order to give a clearer impression of the body proportions relative to the passenger, the figure of a driver 6 feet tall is outlined in Fig. 2.

With regard to painting, although this body is odd in its outline, nothing of the loud in colors should be used. The best combination is the dark blue so much in evidence as the body color with black mouldings and fine hair line striping of lighter blue, together with black leather and black and nickel mountings.

The appointments on a car with this type of body are generally very simple, pockets on the doors being the only part of the trimming of any importance. The horn is placed under the hood and the electric side and headlights and the fenders are standard equipment.

English Limousine Designs Show Novel Features

TWO fine examples of body building, possessing several novel features in design, have just been completed by two well known English motor-carriage builders, Messrs. Mulliner, London, and The Regent Carriage Co., for the Vauxhall Motor Co., England. These are intended for exhibition at St. Petersburg.

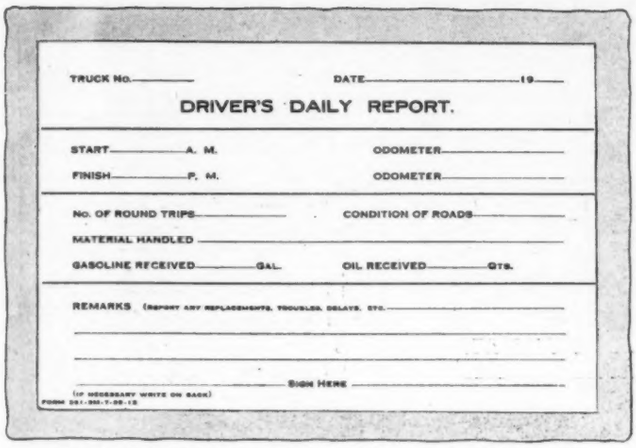
The Mulliner product is an inclosed front limousine with a V-shaped front, that is, the wind screen is in two flat planes extending from cowl to hood and meeting in a vertical cutting edge in the center. A reversed bow window divides the front and rear portions of the body. The glasses, which are frameless, are made to slide past each other, as in a circular fronted brougham, and conversation can be conveniently carried on by the friends in the interior. The window on the right of the driver is divided from top to bottom and slides, so that signals can be made to any overtaking traffic. Two occasional seats are fitted under the front seat, and draw out, lifting up into position against the division.

The upholstery is carried out in fine material of grayish-blue tone, harmonizing with the gray sycamore which is employed in the decoration and finish of the upper part and the roof.

The limousine which has been constructed by the Regent Carriage Co. has an interior treated in an entirely novel manner. The front is of the usual open type, with large and comfortable driver's and passenger's seat, and is finished in black leather, the ceiling being finished in dead white. The upholstery is in a pale-gray corded silk, with a faint relief, and is confined to the lower part of the carriage and the center oval of the roof. The oval type of the body is carried out in the arrangement of the interior. The panels of the doors, the front, and the roof take this shape, as well as the rear window and the outline of the flanking cabinets. These contain the usual accessories to be found in an enclosed car, a barometer forming the centerpiece of one panel and a clock that of the other.

The fine wood employed is harewood, relieved with a fine inlay, and the mouldings round the lights and windows are of a very elaborate character and beautifully and sharply finished. The space between the tops of the doors and the centerpiece is filled in with harewood inlay, very highly polished and finished. The centerpiece is a floral design in silk, of the same shade.

In the center there is a roof ventilator, and four electric lamps illuminate the interior. The windows, all of which, with the exception of the rear one, are made to drop, are balanced and held in place by bolt catches. In addition, sun blinds of stout celluloid, with ground faces, are fitted, so that the car can be used with comfort in the most tropical sunlight.—From *The Motor*, England, April 29.


TRUCK No._____ DATE_____ 19____

DRIVER'S DAILY REPORT.

START_____ A. M. ODOMETER_____

FINISH_____ P. M. ODOMETER_____

No. OF ROUND TRIPS_____ CONDITION OF ROADS_____

MATERIAL HANDLED _____

GASOLINE RECEIVED_____ GAL. OIL RECEIVED_____ QTS.

REMARKS (REPORT ANY REPLACEMENTS, TROUBLES, DELAYS, ETC._____

SIGN HERE _____

(IF NECESSARY WRITE ON BACK)

Fig. 1—Driver's daily report card for Locomobile trucks

Locomobile Truck System

Devised for the Vehicle Users' Cost Keeping

ONE OF THE companies who are making intense efforts to increase the operating efficiency of their trucks used for commercial purposes is the Locomobile Co. of America, Bridgeport, Conn. This concern not only conducts an up-to-date service department in the heart of Manhattan, from where all trucks operating in the Metropolitan territory can be promptly served, but in addition has introduced an inspection system and has devised an elaborate cost-keeping system for users of Locomobile trucks. This system, in addition to the demonstrating and inspection report system of the company, is described below.

The user's cost-keeping system comprises eight blanks, the demonstrating system two and the inspection system one. Before taking up the various forms, it should be remembered that while drafted by the Locomobile company for average truck service, the forms do not meet and are not expected to meet each and every specific condition of truck operation; but they will form a good basis upon which truck operators in various lines of business can design their specific record forms.

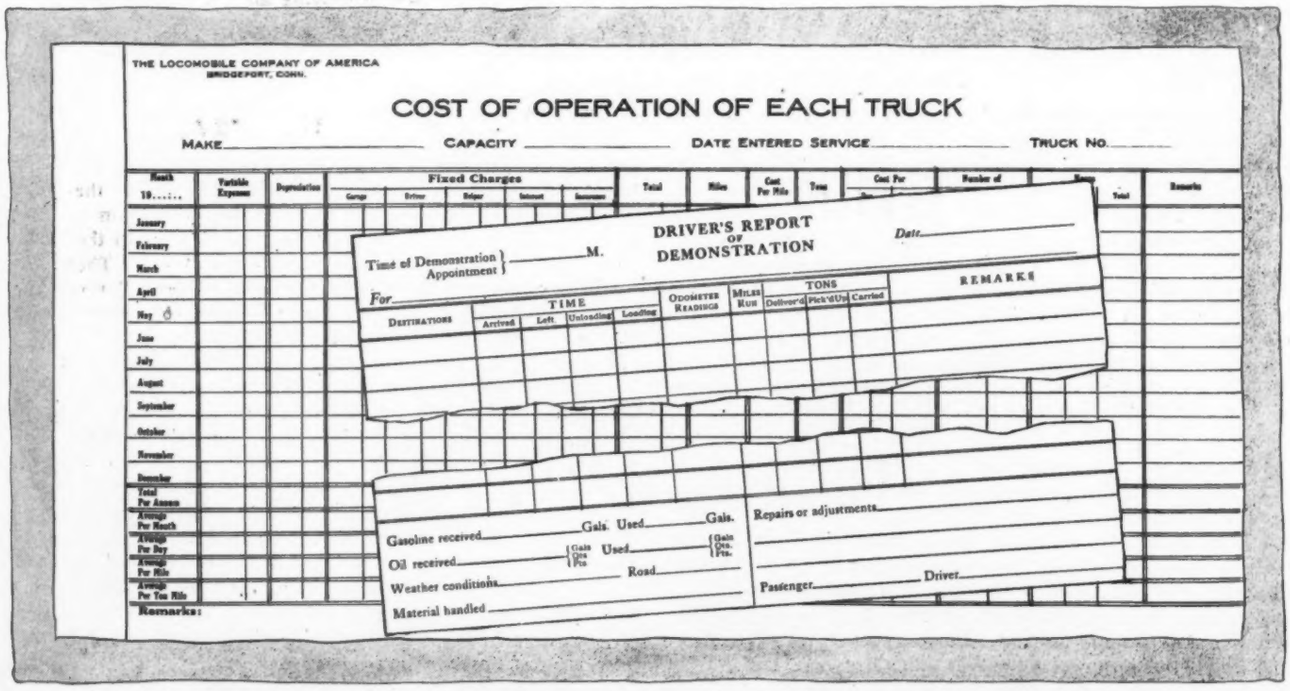
Following are the eight forms used in the cost-keeping system for the operator of commercial vehicles.

1—Driver's daily report card.
2—Daily truck cost report.
3—Monthly variable-expense sheet.
4—Twelve-months' truck-operation cost record.
5—Comparative record of cost of trucks.
6—Tire cost-record and history blank.
7—Repair tag, front and back side.
8—Stock card of repair parts room.

Taking up these forms in the order above, the first blank is

1. Driver's Daily Report Card—This card, Fig. 1, is 6 by 4 inches, printed on thin white cardboard, black, on one side only. The driver starts the form in the morning when starting from the garage, filling out the date, the time of starting and the odometer reading at that time, as well as the amount of gasoline received; likewise, the oil. He records, during the day, the number of round trips made and the nature of the material carried on the truck, and if there are any accidents, if he is forced to call on anyone's help or labor, if there arises the need of buying some material, he records this on the card. In the evening, when he brings the truck back into the garage for the night, he puts down the time of arrival and the odometer reading at that time. The information compiled by the driver is utilized in making up the second form, namely:

2. Daily Truck Cost Report—Fig. 6 shows a sample form of this kind, printed on letter-size paper so as to fit the typewriter. There are spaces on this blank for entering the daily items given under the headings of Fixed Charges and Variable Expenses. In addition to these, there are spaces for recording the time of start and finish, the odometer readings at these times, the number of round trips, the material hauled and the weight carried in tons; as well as the gasoline and oil received and eventual tire adjustments and their cost. Remarks appearing on the driver's report are transferred to this form. As it has been completed by an office clerk, it is forwarded to the transportation manager or delivery superintendent of the business who scrutinizes all the items and if anything is unusual follows it up. Thus, all waste and inefficiency is promptly discovered and may be remedied in short order, or at least recurrence avoided. Under remarks bonuses paid to the drivers for extra trips are recorded, a practice often used to enhance their efficiency.


THE LOCOMOBILE COMPANY OF AMERICA
BRIDGEPORT, CONN.

COST OF OPERATION OF EACH TRUCK

MAKE_____ CAPACITY _____ DATE ENTERED SERVICE_____ TRUCK NO._____

Month 19.....	Variable Expense	Depreciation	Fixed Charges: Garage	Driver	Ledger	Interest	Insurance	Total	Miles	Cost Per Mile	Tons	Cost Per	Number of	Hours	Total	Remarks
January																
February																
March																
April																
May																
June																
July																
August																
September																
October																
November																
December																
Total Per Annum																
Average Per Month																
Average Per Day																
Average Per Mile																
Average Per Ton Mile																

Remarks:

DRIVER'S REPORT OF DEMONSTRATION

Time of Demonstration / Appointment _____ M. Date_____

For_____

Destinations	TIME: Arrived	Left	Unloading	Loading	Odometer Readings	Miles Run	TONS: Delivered	Pick'd Up	Carried	REMARKS

Gasoline received_____ Gals. Used_____ Gals.

Oil received_____ {Gals. Qts. Pts.} Used_____ {Gals. Qts. Pts.}

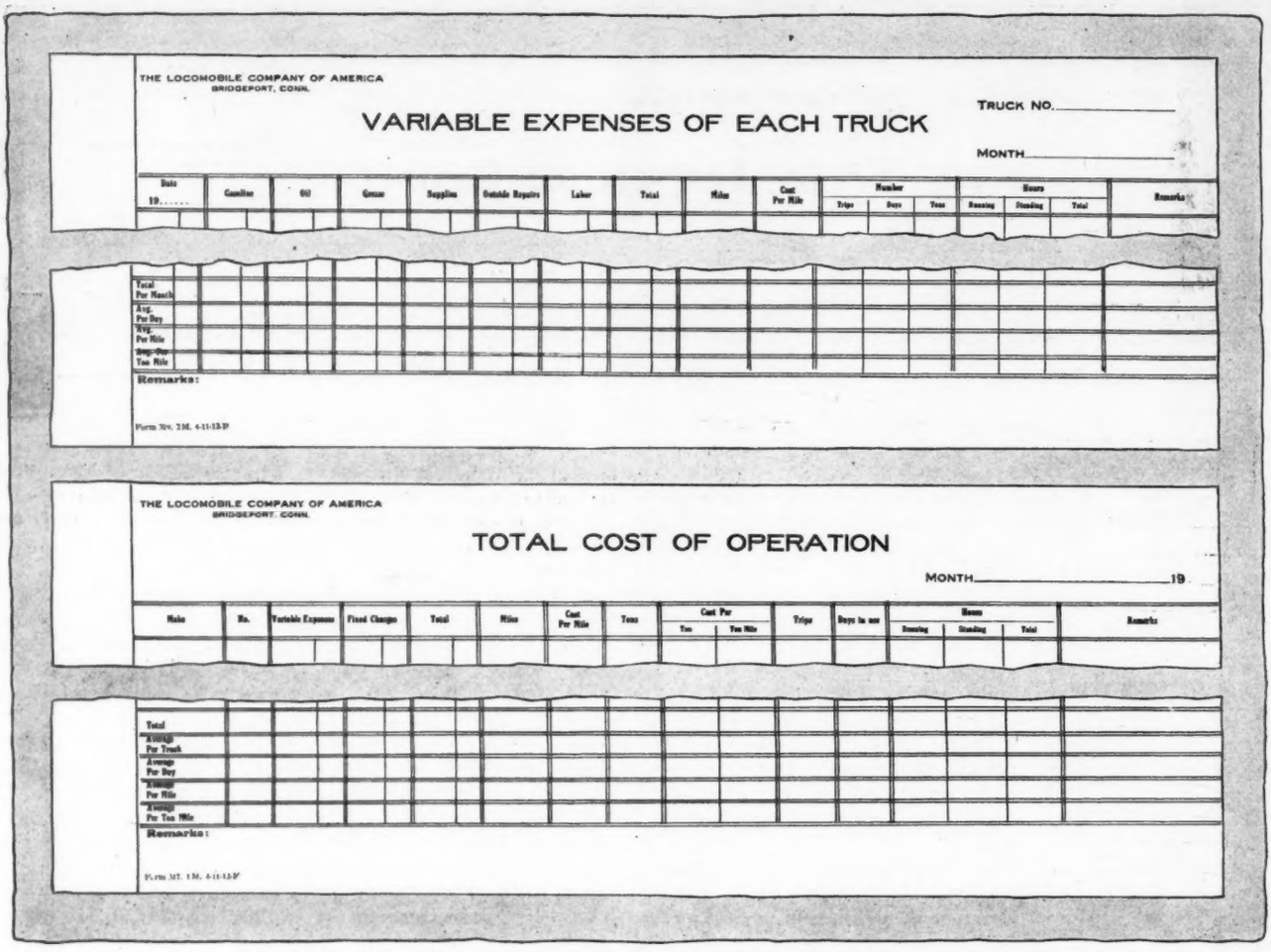
Weather conditions_____ Road_____

Material handled _____

Repairs or adjustments_____

Passenger_____ Driver_____

Fig. 2—Twelve months' truck-operation cost record. Fig. 3—Driver's report of demonstration



THE LOCOMOBILE COMPANY OF AMERICA
BRIDGEPORT, CONN.

VARIABLE EXPENSES OF EACH TRUCK

TRUCK NO._____

MONTH_____

Date 19.....	Gasoline	Oil	Grease	Supplies	Outside Repairs	Labor	Total	Miles	Cost Per Mile	Number: Trips	Number: Days	Number: Tons	Hours: Running	Hours: Standing	Hours: Total	Remarks
Total Per Month																
Avg. Per Day																
Avg. Per Mile																
Avg. Per Ton Mile																

Remarks:

Form No. 2M. 4-11-13-P

THE LOCOMOBILE COMPANY OF AMERICA
BRIDGEPORT, CONN.

TOTAL COST OF OPERATION

MONTH_____19..

Make	No.	Variable Expenses	Fixed Charges	Total	Miles	Cost Per Mile	Tons	Cost Per: Ton	Cost Per: Ton Mile	Trips	Days in use	Hours: Running	Hours: Standing	Hours: Total	Remarks
Total															
Average Per Truck															
Average Per Day															
Average Per Mile															
Average Per Ton Mile															

Remarks:

Form MT. 1M. 4-11-13-P

Fig. 4—Monthly variable-expense sheet. Fig. 5—Comparative record of cost of trucks

3. Monthly Variable Expense Sheet—On every day of the month the variable expenses are not only given on the report, Fig. 2, but they are also recorded on the ledger blank, Fig. 4. This latter is 14 by 8.5 inches, ruled red and printed black on white paper. The prices paid on that day for gasoline, oil, grease, supplies, repairs done outside of the company's shop, repair work done in the shop and their total are given; likewise, the number of miles traveled during the day and the variable cost per mile for the day. The number of trips and the tons carried, as well as running, standing and total-operating hours for the day are also recorded. At the end of the month it is easy to strike averages.

4. Twelve-Months' Truck-Operation Cost Record—In addition to the monthly variable-expense sheet a 12-month record form is kept for every truck in use by the company. The form, Fig. 2, is of exactly the same size and of similar design as the previous form. The monthly totals of variable expenditure are put down on this form, only the depreciation is recorded by itself on account of the importance of this item, it being a means of gauging the extent to which the truck itself, or its life, is consumed by service. The fixed charges are also given by monthly total, and then all these various items are added, giving the monthly grand total expense. To afford ready balance with the work done by the truck for this work, the miles traveled, tons carried and cost per mile, ton and ton-mile are given; so are the working days of the month and the number of trips made, the hours spent in service, running and standing. Then average values for the year, every month of the year, every day of the month, every mile and every ton-mile are calculated.

5. Comparative Record of Cost of Trucks—This sheet, Fig. 5, may be used to compare the operating costs of trucks during

John Smith Company
New York City

Daily Truck Report - Truck No. 15

Investment--$5,000

Driver Wm. Barnes Date March 16, 13

FIXED CHARGES

Driver	$	3.00
Garage		1.80
Insurance		.63
Interest		.42

VARIABLE EXPENSES

Depreciation	$	2.20
Tires		3.40
Repairs (regular)		
Repairs (accident)		
Gasoline (10 gallons)		2.20
Oil		.20
General		1.40
	$	14.45

MEMORANDUM

Start 9.15 a.m. Odometer 2,590
Finish 5.45 p. m. Odometer 2,640
No. Round Trips 5 Road Cond. Fair
Material Cement
Gasoline Received 10 gallons Oil rec'd 4 1/2 gal.
Mileage 50 Tonnage 28
Tire Adjustments.....Date 3/16/1913 Cost $125.50
Remarks (Delay, trouble, etc.)

Signed_____
Transportation Manager

Fig. 6—Daily truck cost report, filled out on the basis supplied by the information given on the driver's daily report and the calculations of all other expenses, as well as the work done by the truck

THE LOCOMOBILE COMPANY OF AMERICA

*Truck No.*_____ **Truck Inspection Report** *Date*_____

*Time*_____

_____ _____ *Inspector*

	AS FOUND	RECOMMENDATIONS
Body		
Brakes		
Carburetor		
Chains		
Chain Cases		
Circulation		
Clutch		
Driving		
General Care		
Ignition		
Lamps & Horn		
Lubrication		
Mileage		
Motor		
Springs		
Steering Gear		
Tires		
Transmission		
Wheels		
Miscellaneous		

Fig. 7—Truck inspection report of Locomobile Co. of America used by its inspectors and from which the letter to the truck owner on condition and needs of the vehicle is prepared

any given period, be it a month, half year or a year. The purpose of this form is to obtain exact information as to the operating values of the several trucks used by the company, which are perhaps of different makes. Thus, there is a space for the make and number of each truck, the variable expense total for the period, the fixed charge total and the grand total, as well as all the other items appearing on the two preceding forms and at the foot of the page are spaces for calculating the averages of each item for the period, on the bases of days, trucks, miles and ton-miles traveled.

6. Tire Cost-Record and History Blank—This form, Fig. 9, is designed in the same style as Figs. 2, 4 and 5. One form is used for each wheel of every truck, or rather, for each tire. The make of the truck and its capacity, the number and size of the wheel are noted on the top of the sheet. In the ruled section, the make of the tire used on the wheel, its manufacturer's number, the date of installation and demounting and the mileage got out of it are noted. The cost or price of the tire paid when it was bought is also recorded. In case of an adjustment, if a new tire is obtained from the tire maker on additional payment, the order number, tire number, etc., are recorded. When the new tire is worn out, the mileage is also noted, as is the cost, and by adding costs and mileages for both tires an average cost per mile for the tire is obtained.

7. Repair Tag—The truck purchasers are also given repair tags so as to keep track of the cost of repairs and materials and labor used for them. The tag is, of course, needed only where a regular truck fleet is used and a consequently large repair shop and stock of repair parts is maintained. Fig. 10 shows the front side of the tag and Fig. 11 the back side. When a driver brings in his truck in the evening and finds that it is necessary to do any repair or overhaul work, he fills out the front side of the tag. The reverse side is used for a statement of how the instructions given on the front were carried out, together with the cost of the job. The repair work being done, the card is sent to the office the same day, so that on the following morning, when the cost reports for the day past are made out, the cost of the job is included in the expense charged to the specific truck.

8. Stock Card of Repair Parts Room—A suitable card designed by the Locomobile company for repair-parts rooms bin and card-files is shown in Fig. 12. This card is 6 by 4 inches, ruled red and blue and printed black. Whenever new material is taken into stock it is entered on the card and outgoing parts are checked off, both on the bin card and file card, which two must always correspond and are balanced at regular periods.

The system used for keeping record of truck demonstrations is also very simple, but fully sufficient to note all important and interesting data. Two forms are used for this purpose by the company.

Fig. 3 is filled out by the driver of the demonstrating truck at

Locomobile Company of America

_____ Date _____

Report of Demonstration

Made for _____

Time of Demonstration { Appointment } _____ M.

DESTINATIONS	TIME Arrived	TIME Left	TIME Elapsed Unloading	TIME Elapsed Loading	TIME Elapsed Standing	TIME Elapsed Running	Miles Run	TONS Deliver'd	TONS Pick'd Up	TONS Carried	REMARKS
Total Stops ____	Elapsed Time ____		Total	Total	Total	Total	Total	Total	Total	Total	General Remarks:

Material handled _____ Weather Conditions _____

Results: Road Conditions _____

Total time elapsed _____ Average between stops _____ miles

Time loading _____ Unloading _____ Gasoline used _____ gallons

Time standing _____ Running _____ Lubricating oil used _____ { quarts / pints

Total miles _____ Miles per gallon gasoline _____

Average miles per hour _____ Cost of supplies _____

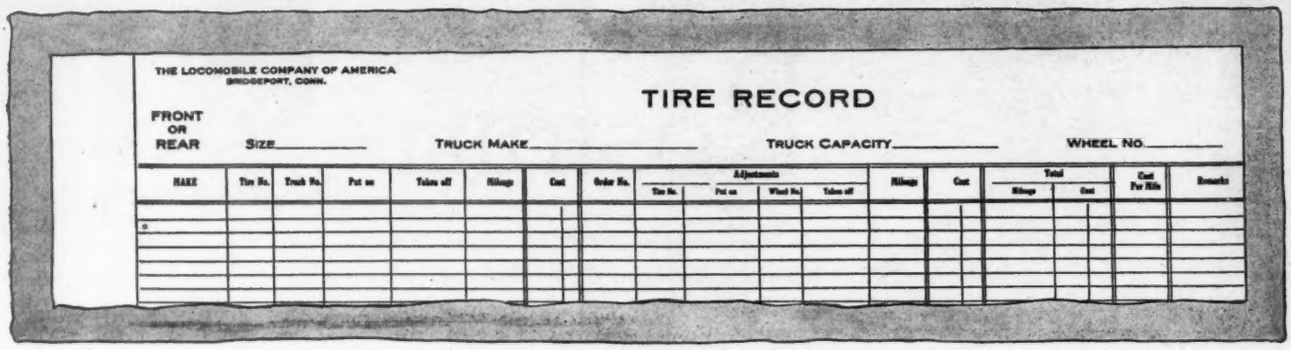
Number of stops _____ Driver _____

Total tons carried _____ Passenger _____

Repairs or adjustments _____

Salesman Demonstrating _____

Fig. 8—Office file copy of demonstration report


THE LOCOMOBILE COMPANY OF AMERICA
BRIDGEPORT, CONN.

TIRE RECORD

FRONT OR REAR SIZE TRUCK MAKE TRUCK CAPACITY WHEEL NO.

MAKE	Tire No.	Truck No.	Put on	Taken off	Mileage	Cost	Order No.	Adjustments: Tire No.	Adjustments: Put on	Adjustments: Wheel No.	Adjustments: Taken off	Mileage	Cost	Total: Mileage	Total: Cost	Cost Per Mile	Remarks

Fig. 9—Tire cost record and history blank

the occasion of every demonstration made. It is 8 by 6 inches, printed on rather stiff tan paper and ruled black. The driver fills out the date, the hour of the demonstration appointment and the name of the company for whom the demonstration is arranged. Then he begins to use the space lined for tabulated work, as he takes up the actual demonstrating work. He fills in the first column with the destination of the first trip, the time of arrival at the point of destination, the time of leaving, and the time spend in unloading and loading. At each place the odometer reading is taken and the length of the way from the previous stop calculated. Likewise the loads are reported. At the end of the day the miles traveled, the loads carried, the time spent in waiting, loading and unloading are totaled. Gasoline and oil received and used during the day are also recorded, as are the weather, the kind and conditions of the road traveled, the material handled, and repairs made during the day. The driver and a representative of the prospective customer sign the card, which is delivered to the office of the Locomobile company when the truck returns to the garage.

In order, however, to have a clean, accessible record on hand in the office at all times, not only are all driver's demonstrating reports kept in a file for just these cards, but a copy is made of every report as a card is brought in by a driver. For this copy, a blank, Fig. 8, is used, which is printed black on a sheet of white paper, 15 by 11 inches. This form is filled in on the typewriter to give a clean, legible statement.

The inspection report, Fig. 7, is filled out by the Locomobile company's inspectors whenever a truck is looked over. Once a month this is done, and the company sends its inspectors out to meet the trucks at their own garages or on the road, where it is more suitable. The inspector, upon reaching the truck, looks over the motor, running gear and all other parts of the car and makes notes of which parts are in good condition and which are requiring attention. This report form is dated and signed.

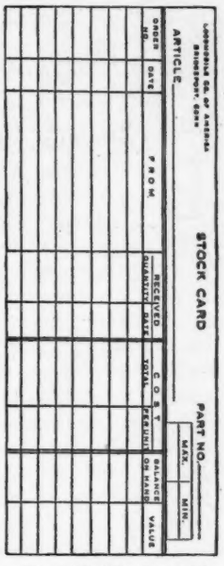


Fig. 12—Stock card

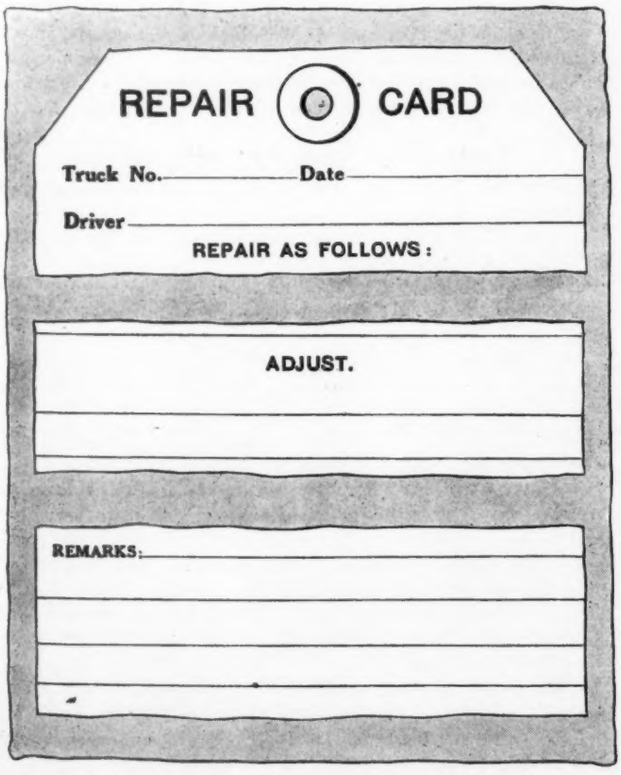
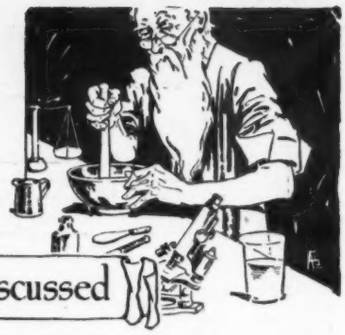


Fig. 10—Front side of repair tag

Fig. 11—Back side of repair tag

The Rostrum



In which Letters from Readers are Answered and Discussed

Dirty Carbureter Causes Trouble—Mysterious Ignition Trouble—Buying Slipcovers Out of Town—Horsepower of Late Sixes—Electric Gearshift Provokes Interest—Likes Rear Axle Gearbox—Defining A. L. A. M. Plug

Trouble Caused by Dirty Carbureter

EDITOR THE AUTOMOBILE:—I have a model 10 Buick, 1909, in first-class condition, equipped with model L Schebler carbureter, Remy magneto, Mosler spitfire breach block plug and is well timed. When running the car idle it will throttle down and will speed up without missing with spark retarded and when spark is advanced half way, but will miss when spark is fully advanced and throttle opened all the way. When running on high gear, the car will run 25 miles an hour without missing with the spark fully advanced but will miss after that speed. If spark is retarded half way the car will run 30 to 40 miles an hour without missing. The car has been running like this for the last 2 years. Engine never knocks, will pull until dead without knocking and will run perfect at 6 miles an hour. Magneto was overhauled by factory last year and new wiring installed on the car; the valves are ground every 3 months; I keep the points cleaned on the timer. The platinum point is not burned on the timer and makes a contact.

Mt. Vernon, Ind. J. ROSENBAUM.

—Your trouble is one of carbureter adjustment, or it might be that the gasoline line is not clean and you may be reasonably sure the latter is the case if you have not cleaned it out during the past 2 years, during which time the trouble has existed. It would be advisable to take the carbureter off, remove the float chamber and clean it out. If you have a screen in your gasoline line, take that out and clean it also. If this fails to give results try a different air adjustment on the carbureter. Should the miss still continue after you have done everything in your power in this direction, consult the Schebler company as to the correct size carbureter to use on your car. It may be that through some error you have a carbureter which is too small.

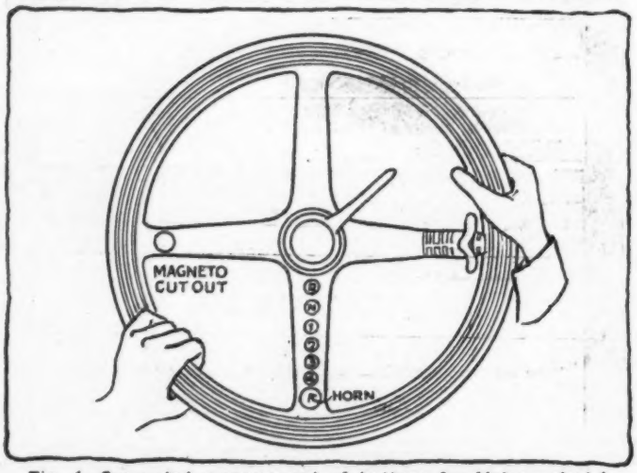


Fig. 1—Suggested arrangement of buttons for Vulcan electric gearshift.

Difficulty with a New Coil

Editor THE AUTOMOBILE:—We would like to relate a little experience we had today and ask you what the trouble was. An E. M. F. car of about the year 1909 or 1910 came to have us put on a new Splitdorf non-vibrating coil in place of one of same make that came on the car. We put it on and connected it just as the old one was (by-the-way, the car was running fairly well on either battery or magneto when it came in), and never could get a spark from the magneto, but it ran as well as ever on the battery. As the customer was in a hurry and was afraid of his battery, we put back the old coil and the car went off just as it came in. Now, why wouldn't it run on the magneto the same with either coil? Was the trouble in the new coil? We took it out of the express office for him and think it was direct from the agency.

Bosworth, Mo. BOSWORTH GARAGE.

—The trouble could have been due to either one of two things. First, the wiring may have been incorrect and second there may have been a break down somewhere in the coil. In the first case the probable mistake in wiring would be the connection of the A post on the magneto, the armature, to the ground instead of to the A post on the coil would cause it to run properly on the batteries but not on the magneto. Secondly a breakdown in the switch box of the coil could cause the same thing.

Wants Cloth Slipcover on Overland

Editor THE AUTOMOBILE:—1—Which is correct, carburetor or carbureter?

2—What firms make seat and back cloth covers for Overland 69-T cars? About what is the cost?

3—Can the S. G. V. Vulcan electric gearshift be applied to an Overland 69T, equipped with the U. S. L. lighting and starting apparatus?

4—Would you advise connecting the auxiliary air opening on Schebler carbureter to exhaust pipe in order to get hot air, the fixed air opening being already so connected?

Inman, S. C. C. G. F.

—1—Both methods of spelling are correct.

2—Practically every automobile paint shop in the country has arrangements with some upholsterer where this work can be done. The cost will vary according to the quality of the goods used in the cover. Mohair makes an excellent material for this and you can have a set made up by the Gotham Auto Top Co., of New York City for $45. This concern handles the Overland work and can make the covers from the standard dimensions and ship them to you.

3—The gearshift is made by the Vulcan Electric Devices Co., of Philadelphia, Pa. This company could no doubt fit the device to your car but it would mean that the entire gearset would have to be rebuilt.

4—This would not be a bad idea and would probably give a

little higher efficiency in cold weather. In warm weather the difference would not be noticeable.

Horsepower of Late Sixes

Editor THE AUTOMOBILE:—1—What is the mean brake horsepower of the 1914 big six American, 1913 big four Apperson, 1913 big six Knox and 1913 big six Mitchell?

2—Do the Apperson and National companies make six cylinders? If so, what are the dimensions?

3—What is a good weight for a six- or seven-passenger touring car of about 48 to 50 horsepower, A. L. A. M. rating for touring?

Lakewood, O. C. S.

—1—The 1914 big six American develops 65.4 horsepower at 1,000 revolutions per minute; the Apperson develops about 40; the Knox 60 and the Mitchell about 50 at 1,000 revolutions per minute.

2—Neither Apperson or National have a 1913 six-cylinder car.

3—The car should weigh, with the body, within 500 pounds either side of 4,000 pounds. The average is about 4,000 pounds.

Operating Electric Gearshift

Editor THE AUTOMOBILE:—Kindly explain the principle of the S. G. V. electric gearshift. Is it possible to effect a change by pressing number two some time before releasing clutch and have gears shift when clutch is thrown out? That is, if running on third speed and wishing to change to second you press number two before you change. Would the gears shift into second when clutch is thrown out after the button had been pressed when ready to change even after a considerable interval?

Worcester, Mass. J. GLASS.

—The electric gearshift used on the S. G. V. car which was described in a recent issue of THE AUTOMOBILE is operated by a system of solenoid coils which pull the gears into position with a force of 300 pounds. It is impossible to pull two gears into position at the same time on account of the interlocking buttons which are so arranged that only one can be down at a time. If two buttons are pressed at the same time, but one will go down, or if one button is pressed while another is down the latter will jump up. You may press down a button any length of time you desire before changing to the speed corresponding to that button. If you press down No. 2 while you are running in third gear the gears will shift when you press down your clutch regardless if the time elapsing was a week or 2 minutes. If you change your mind as regards the gear you intend to shift to it is only necessary to press down another button and the one which is already in position will come up.

Arrangement of Shifter Buttons

Editor THE AUTOMOBILE:—I am sending a suggestion, Fig. 1, for a better arrangement of the buttons on the steering wheel of the S. G. V. The correct position of the hands when driving makes it more convenient for the driver to reach the buttons than in the arrangement used by the S. G. V. company

Mokelumne Hill, Cal. CLIFFORD H. MEAD.

—The arrangement of the gear shifter buttons on the demonstrator model of the S. G. V. car is shown in Fig. 2. This arrangement is used on the first few cars that were equipped with the electric gearshift. The regular arrangement will be that shown in THE AUTOMOBILE for April 3, page 778.

Likes Rear Axle Gearbox Best

Editor THE AUTOMOBILE:—I am in favor of a gearbox mounted on rear axle as close to differential as possible. From the scientific side, the universal joint and propeller shaft have only the strain delivered direct from engine and not multiplied or stepped up, through the gear ratios in the transmission. Another advantage, the transmission is away from any underpan and any noise in same is not as perceptible as when mounted on motor as a unit. Transmission on motor as a unit makes an easier assembling proposition in building up chassis, but fastens more or less noise direct on motor, and gear noise is very apt to be telephoned to different parts of motor, especially where flywheel is incased. If forced to have a unit with motor, would prefer to arch around, and leave flywheel open with universal joint between transmission and flywheel. Transmission amidship is good construction but a little harder to assemble and line up, but has some good advantage also.

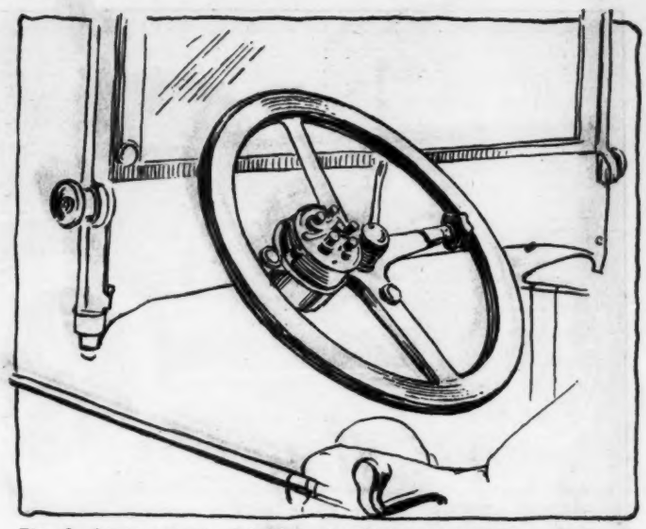


Fig. 2—Arrangement of buttons for Vulcan gearshift on S. G. V. demonstrator

Connersville, Ind. E. M.

Dimensions of A.L.A.M. Thread

Editor THE AUTOMOBILE:—1—What is the difference between the A. L. A. M. standard, half inch, and the metric spark-plug threads?

2—Where is the safety spark gap on the Ford ignition system?

3—Did the Ford Motor Car Co. ever use a brush in its timer instead of a rolling contact?

4—On a 22.5 horsepower A. L. A. M. rating, could the horsepower be increased as in the Ford model 7, by putting on a larger flywheel, leaving the magneto out?

Nora, Neb. A MOTORIST.

—1—The .5-inch spark-plug employs the regular .5-inch gaspipe thread, which is a taper thread. The old A. L. A. M is a .875-inch straight thread with a gasket top There is a .0625-inch allowance for the gasket at the top of the plug above the thread. The metric thread, which is used to a large extent in foreign cars, is 18 millimeters or .7087 inches in diameter and has a pitch of 1.5 millimeters or .059 inch. The A. L. A. M. has now passed out of existence and the .875-inch straight-thread plug has been adopted as the S. A. E. standard. The plugs now in most general use in this country are the .5-inch gaspipe and the S. A. E. standard, but the latter is being gradually adopted as the preferred type.

2—There is none.

3—No.

4—The horsepower developed by the motor would not be increased but the magneto would not be there to absorb the power necessary to create the electric energy to form a spark. This would give a slightly greater output to the road wheels if you cared to run on batteries. This would be a very foolish move, however, as is no doubt self-evident. The power absorbed is so small as to be unnoticeable and the batteries should only be used in starting or for emergency equipment.

Knocks While Running Idle

Editor THE AUTOMOBILE:—I have a Ford car which I had overhauled last winter. The repairman tightened up all bearings. After running a while the motor developed a knock when running idle. It does not knock when running fast. What do you think causes this knock?

Jacksonville, Ill. J. A. HASP.

—There is a possibility that the spark is too far advanced and

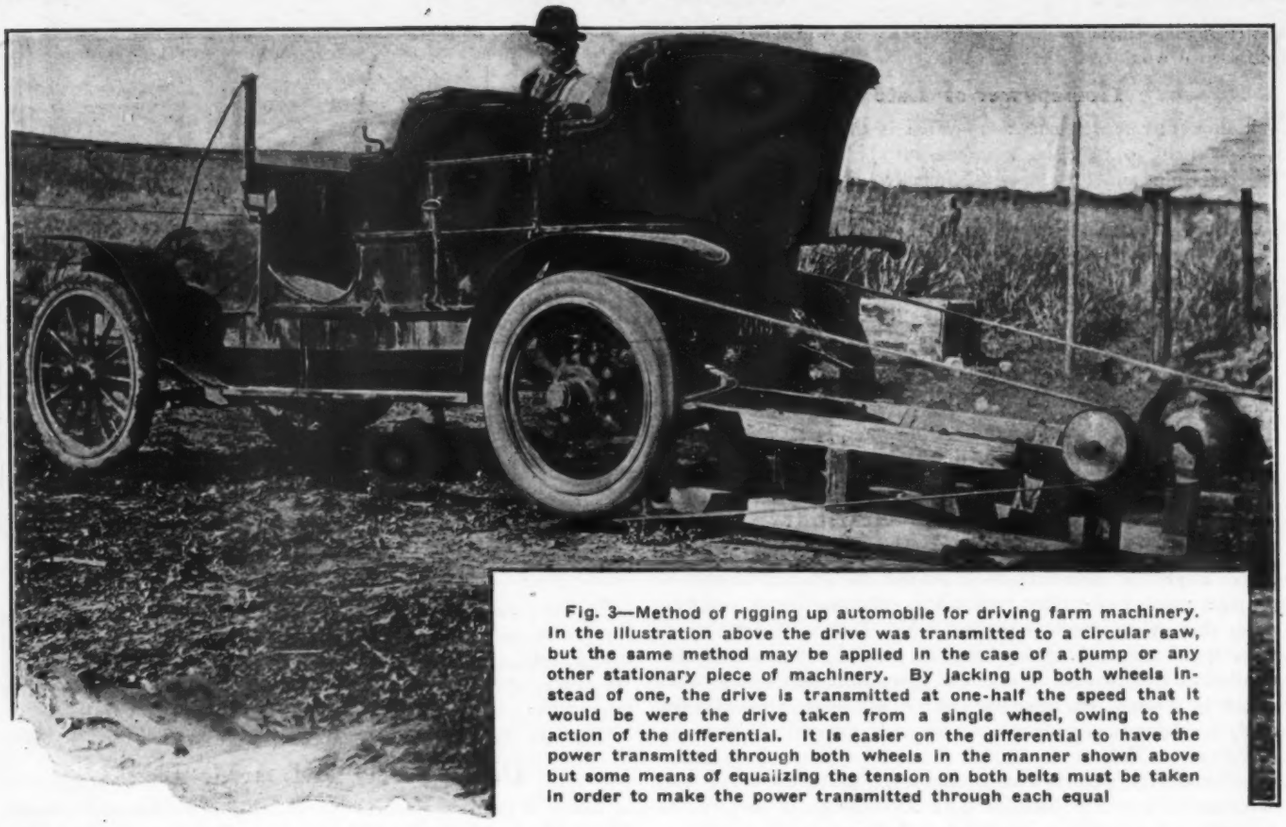


Fig. 3—Method of rigging up automobile for driving farm machinery. In the illustration above the drive was transmitted to a circular saw, but the same method may be applied in the case of a pump or any other stationary piece of machinery. By jacking up both wheels instead of one, the drive is transmitted at one-half the speed that it would be were the drive taken from a single wheel, owing to the action of the differential. It is easier on the differential to have the power transmitted through both wheels in the manner shown above but some means of equalizing the tension on both belts must be taken in order to make the power transmitted through each equal

that you do not get sufficient retard for idling. When the motor is idling the spark should occur very late or the knock is bound to occur. There are many other possible causes for the knock besides the faulty ignition timing outlined above. The trouble might arise from a piston slap, a loose connecting-rod bearing, a loose main bearing, a short circuit, a carbon point or many other causes which may be of an indirect nature and which would never be suspected.

Wants to Change Bendix Drive

Editor THE AUTOMOBILE:—I have a Bendix car of the vintage of 1908 which can still give good service on bad roads but is noisy and needs frequent attention in its transmission box. I desire to change it from a double disk to a single disk drive, connecting the one disk direct to the engine. To make this change it will be necessary to have but one jackshaft, which must have a differential. The method of sliding the one disk to engage or disengage the power must also be altered. The shift can readily be placed on the other side. Your assistance is desired in giving me the name of some maker of jackshaft differentials and devising some way to slide the disk on its shaft. The car weighs 2,350 pounds, hence a differential like that used in the Metz car is too light to stand the work. Plan view of the Bendix chassis is herewith inclosed.

Fulda, Minn. H. EMIL KING.

—The best course for you to pursue would be to purchase an entire transmission unit from one of the concerns specializing in this kind of work. To attempt to design a new friction set and then to have it made up specially for your car would be an expensive undertaking and would not be justified. The nearest large concern to you which specializes in this kind of work is A. O. Smith Co., Milwaukee, Wis.

Carbon Deposits Due to Gasoline

Editor THE AUTOMOBILE:—I see so many of the oil companies advertise that they have an oil that does not cause carbon and this has led me to believe that there must be other causes for the carbon annoyance to which we are all submitted. Could the Rostrum give some information on this?

2—Does poor scavenging affect some of our modern automobile motors?

New York City. READER.

—1—Carbon accumulations are frequently due to gasoline. In the past there has been so much talk about the cracking of the lubricating oil and the formation of a deposit of carbon out of the same, that automobilists generally labor under the false impression that the excesses of carbon, of which they so justly complain, are entirely due to the use of poor oil, or the flooding of the cylinders with the same. It is highly improbable that a pure hydro-carbon lubricating oil will deposit carbon in the combustion chamber space in sufficient quantity to give any trouble at all. If the lubricating oil is adulterated with resinous oil there may be some cause for complaint. Automobile gasoline is at the bottom of a large percentage of the carbon trouble, it being the case that this type of gasoline volatilizes but slowly at best, and, unfortunately, it is a fault of carbureters in general to deliver an excess of gasoline at the higher range of speed if the amount of the gasoline is in the right proportion at the low speed. For the purpose of illustrating the lack of volatility of automobile gasoline all that is necessary is to take a blow-torch, fill it with automobile gasoline, light the torch in the regular way and set it down in front of a plate at a distance of four or five feet from the same, and then by turning on the gasoline so that it squirts out with considerable pressure it will be found that the more volatile fractions of the liquid will burn, and the less volatile parts will strike the plate and fall down to the ground without burning at all. If this less volatile product is collected in a pan until there is a considerable amount of it, and it is then allowed to cool off, as a further proof of its non-volatile properties a piece of newspaper may be set on fire and thrown into this pan of liquid, only to find that it will quench the flame. The non-volatile part of the average automobile gasoline mixture is not far from 50 per cent. of the whole content.

2—Incomplete scavenging is at the bottom of some of the poor performance of motors. The time available for the removal of the products of combustion after the power stroke in the motor is too short to permit of complete scavenging in any case. How to realize the best possible condition of scavenging is the remain-

ing problem. In view of the fact that the piston does not sweep the whole space, some of the mixture, after it is burned, must depart under the force of its terminal pressure. After the terminal pressure dies out the part of the gas that is usually left behind is that which accounts for the bad scavenging relation complained of. It has been found in practice that the scavenging condition may be improved by using a small-diameter pipe between the transfer port on the exhaust side of each cylinder of the motor, and a receiver. In this plan, owing to the small diameter of the connecting pipe, the speed of the departing exhaust product is accelerated, and the exhausting "fluid' is compacted, and not unlike the performance of a "comet," the gas molecules persist in accompanying each other on the journey, and the tail of the gas body (comet) follows the head, and in this way the rarefied gas in the combustion chamber at the tail end of the exhausting period follows in the train of the departing "fluid," thus more or less completely scavenging the space. It has been found under certain well defined conditions that a vacuum will reside in the cylinder after the exhaust leaves, which vacuum very readily fills with the incoming mixture, and the performance of the motor from the power and thermal efficiency point of view is thereby much enhanced.

Taking Power from Rear Wheels

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for April 3, page 748, I see a cut of a motor truck with one rear wheel jacked up, belted and running a pump. Does it injure the differential to jack up one wheel and use it for power purposes in this way? Do you know of any better way of utilizing a car for running a pump, or any work requiring stationary power? I want to use my car for power purposes occasionally and would like to know the best way to connect it.

Wasta, South Dakota. A. MATHIAS.

—In using either a passenger car or a truck for stationary power plant purposes it is best to take the power from both wheels as shown in Figs. 3 and 4 rather than by jacking up one wheel. If the car is to be used only occasionally for this purpose jacking up a single wheel would be satisfactory and would not be detrimental in any way to the car, but it would be better where the car is to be used very often for this purpose to erect a small plant like that shown in the illustration. The differential gearing is not put to so severe a strain as it is where only one wheel is used, and besides that the speed is kept down to one-half that which it would be where one wheel is used. The action of the differential is such that it doubles the speed when one wheel is held stationary and the other is free to turn. The accompanying illustrations show the car rigged up to run a sawmill, but the principle is the same when applied to the pump. A truck has recently been brought out which includes an attachment by means of which it serves the purpose of a stationary power plant. This is known as the Service truck and is illustrated in Fig. 5. The pulley seen on the rear end of this truck is driven by independent friction drive device which can be thrown in and out at will.

Duryea for the Light Vehicle

Editor THE AUTOMOBILE:—The remarks of Mr. Bourgette on page 906 of THE AUTOMOBILE for April 24, that "There is nothing so fraught with danger to the automobilist as the skid," states concisely a great truth, and Mr. B.'s suggestion as to how to remedy a skid is valuable, provided there is room to put it into effect; but the man who is already on a narrow road dare not turn into the ditch when his rear wheels begin to skid off the road. The cure would be just as disastrous as the disease. It seems to me much wiser to select a construction which minimizes skidding. Every mechanic knows that once the standing friction is destroyed, one part will move upon another easily in practically any direction. A sudden application of power of the brake, or sudden change of direction destroys the hold of the wheels on the road, and the skid begins. What is wanted is some provision which prevents this beginning. My experience, proven by many years of construction, is that heavily-loaded drivers with lightly-loaded front wheels seldom skid. The reason is that the weight on the drivers hold them in contact with the ground, and there is little likelihood that a sudden application of power, or the brake, will start them slipping, because the front of the vehicle is so light that no great effort is required to overcome this inertia. How long will it be before the automobile-using public realizes the many advantages of carrying the load on the propeller and braking wheels? The locomotive builder learned this fact years ago. The cycle rider knows the advantage of a lightly-loaded front, but the automobile buyer refuses to profit by their experience, and continues to use vehicles which are both expensive and dangerous, not only to himself, but to others.

Saginaw, Mich. CHARLES E. DURYEA.

Please Sign Your Inquiries

The Editor of this department is in receipt of several letters which bear no other signature than the sender's initials or some such word as "Reader" or "Subscriber." While the sender's name will not be published if he desires that it be witheld, the signature must accompany the letter. In cases where a quick answer by mail is desired to inquiries, a stamped and self-addressed envelope should accompany the letter.

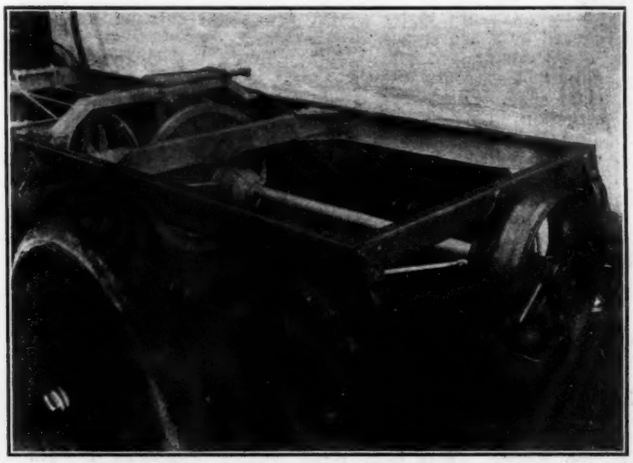
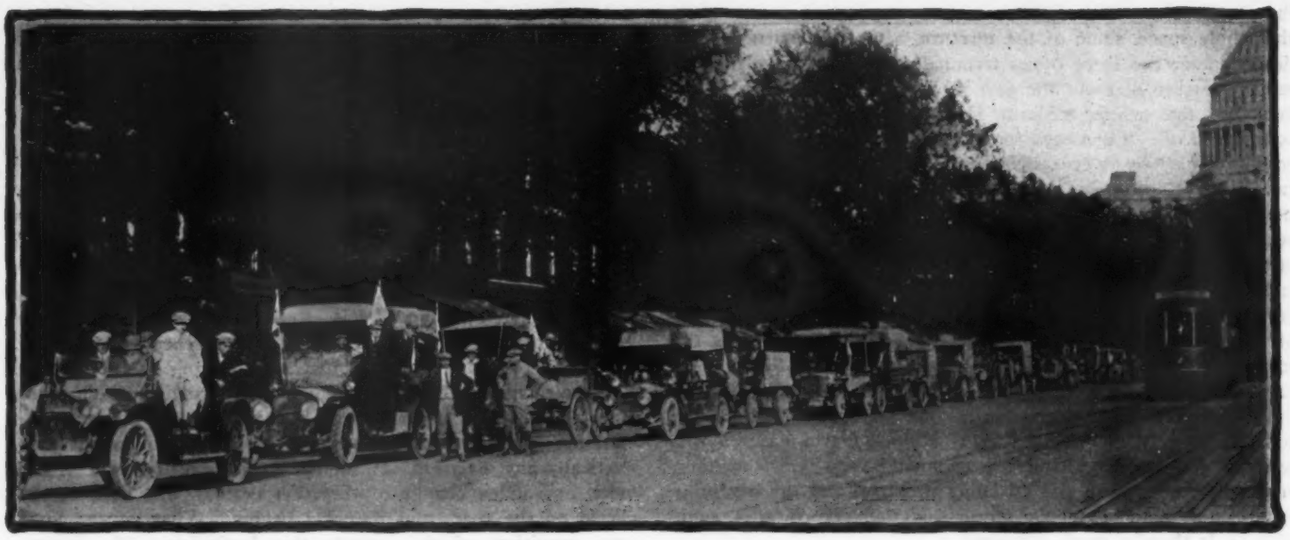


Fig. 4—This shows the method of driving the saw from a central wheel between the two pulleys, through which the power is transmitted through belts from the road wheels

Fig. 5—This truck has a friction drive pulley wheel mounted independently of the road wheels. This permits stationary operations to be performed without jacking the wheels



Showing the contestants at the finish of the parade down Pennsylvania avenue, Washington, D. C.

Vulcan Wins Washington Contest

(*Continued from page* 1011)

No. 5 Wilcox, gross load, 6,260 pounds, U. S. demountable, fronts 36 by 3.5, rears 36 by 4. "Right rear blew out or burst about 7 miles before reaching Hagerstown, noon stop on first day's run. Was replaced following morning in 24 minutes by driver. Second right rear slightly cut."

No. 8 Rowe, gross load, 11,435 pounds, Goodyear side flange demountable, fronts 36 by 5, rears 36 by 3.5, block duals. "Front tires in good shape; rears badly cut and broken."

No. 9 Hupmobile, gross load, 3,120 pounds, Goodyear pneumatic plain tread in front, non-skid tread rear, fronts 35 by 4, rears 35 by 4. "Had one puncture in front and put on Goodrich. One puncture in rear and put on Goodrich."

No. 10 McIntyre gross load, 7,575 pounds, Swinehart side flange in front and Swinehart duals rear, fronts 34 by 3.5, rears 36 by 3 duals. "A few miniature cuts."

No. 11 Autocar, gross load, 7,125 pounds, Swinehart side flange in front and Swinehart cellular in rear, fronts 36 by 4, rears 36 by 4.5. "Fronts considerably cut on treads, rears slightly worn and filled with a number of small stones."

No. 12 Lauth-Juergens, gross load, 9,715 pounds, Goodyear demountable, fronts 36 by 4, rears 36 by 5, solids. "All four tires in fine shape."

No. 13 Atterbury, gross load, 4,720 pounds, Goodyear solid clincher fronts 36 by 3, rears 36 by 3. "Front tires in good shape, rears badly cut from sharp stones. Was undertired."

No. 14 Atterbury, gross load, 6,150, Goodyear side flange, fronts 36 by 3.5, rears 36 by 4. "A few slight cuts in the sides caused by sharp stones."

No. 15 Atterbury, gross load, 7,475 pounds, Goodyear solid demountables, fronts 36 by 3.5, rears 36 by 5. "Fronts in first-class shape. Right rear slightly cut on inside by sharp obstruction. Left rear in fine shape."

No. 16 Atterbury, gross load, 9,650 pounds, Goodyear side flange, with rear duals, fronts 36 by 3.5, rears 36 by 3.5. "Fronts in fine shape. Inside rear dual a little loose at base."

No. 17 White, gross load, 5,175 pounds, Goodrich pneumatics front, Kelly pneumatics rear. Fronts 34 by 4, rears 34 by 4.5. "A few slight cuts in treads, otherwise in fine shape."

No. 18 White, gross load, 7,950 pounds, Diamond pneumatics, rear duals, fronts 36 by 4, rears 36 by 4.5. "Right rear inside tire had bad cover cut; left rear inside blew out near Baltimore; slight cuts in others."

No. 19 International, gross load, 3,675 pounds, Firestone side wire, fronts 42 by 2, rears 42 by 2.5. "Miniature cuts in right rear."

No. 20 Atterbury, gross load, 4,680 pounds, Goodyear non-skid pneumatics, fronts 35 by 4.5, rears 35 by 4.5. "Tires hardly worn, in fine shape."

No. 100 Brown, gross load, 6,780 pounds, Overman cushion, fronts 36 by 5, rears 36 by 5.5. "The inside notches of the tread slightly raised up from the outside, tires generated a lot of heat."

No. 101 F W D, gross load, 7,480 pounds, Goodyear non-skid, fronts 36 by 5, rears 36 by 5. "All tires in perfect shape."

No. 102 White, gross load, 6,630 pounds, Overman cushion, fronts 36 by 4, rears 36 by 4.5. "Tires the same as No. 100 Brown."

The brake tests at the completion of the run were made on a level asphalt street, the trucks carrying the load they had during the demonstration. Each vehicle approached the braking line at its contesting speed. At a signal the foot brake was applied and the distance in feet required to bring the truck to a stop measured. The hand brake was similarly tested. The rules allowed a distance of 50 feet without penalty and imposed one point per foot or fraction thereof for all distances above the 50-foot mark. Only one vehicle was penalized, that being No. 101 Four-Wheel-Drive which had its braking interfered with by the differential between the gearbox and the forward axle being damaged on the last day of the run. It required 74 feet with the hand brake but stopped in 46 feet with the foot brake.

The 50-foot rule in which a truck must stop is a hand-down from passenger car tests. This distance is entirely too great for trucks; in fact, it is questionable if 30 feet would not be a better rule.

The following tabulation shows the distances required by the different trucks, together with the speeds at which they took these tests and the load classification they were under:

No.	Name	M.P.H.	Load	Foot	Hand	Penalty
1	Vulcan	8	4 tons	27	46	0
2	Mais	10	1.5 tons	12	27	0
3	Little Giant	11	1 ton	23	48	0
4	Witt-Will	10	1.125 tons	33	18	0
5	Wilcox	11	1 ton	17	19	0
8	Rowe	10	2.5 tons	14	46	0
9	Hupmobile	12	.4 ton	31	28	0
10	McIntyre	10	1.5 tons	43	29	0
11	Autocar	10	1.5 tons	36	36	0
12	Lauth-Jurgens	10	2 tons	25	33	0
13	Atterbury	12	.75 ton	49	46	0
14	Atterbury	11	1 ton	27	19	0
15	Atterbury	10	1.5 tons	46	28	0
16	Atterbury	10	2 tons	50	36	0
17	White	12	.75 ton	20	30	0
18	White	10	1.5 tons	12	13	0
19	International	12	.5 ton	19	43	0
20	Atterbury	12	.75 ton	45	22	0
100	Brown	12	Persons	39	46	0
101	F. W. D.	12	Persons	46	74	24
102	White	12	Persons	19	27	0

This tabulation shows that the best brake test was made by No. 18 White, making its stops in 12 and 13 feet, but a few inches more than the vehicle's wheelbase.

In addition to a brake test, each vehicle was given a clutch and transmission test. The clutch test consisted in bringing the front wheels against a vertical 8-inch curb. The low gear was engaged and the trucks then required to mount the curb, spin the rear wheels or stall the motor. Vulcan, Wilcox, Rowe and No. 18 White mounted the curb with ease. Witt-Will, Hupmobile, McIntyre, Lauth-Juergens, No. 14 Atterbury, No. 17 White and Brown, Four-Wheel-Drive and No. 100 White, spun the rear wheels, either one or both. The remainder stalled their motors with the exception of No. 20 Atterbury, which had a

slipping clutch and was given 5 points penalty under the rules.

The transmission tests consisted solely in seeing that the different trucks could travel on their respective speeds, that is, reverse and all of the forward speeds. Not a penalty was imposed in this test.

The contestants had during the entire road demonstration looked forward to the technical test at the end of the run when all parts of the chassis would be looked over carefully for broken damaged or sprung parts. This examination was made the afternoon following the completion of the run and the work of the technical committee occupied 5 or 6 hours. Few serious defects were discovered, but all were given the penalty as required by the rules.

The following is the complete result of the technical examination with the penalties assessed in each case as well as a day-by-day report of road penalties:

The following is a complete day-by-day record of the penalties that were made on the road. Points were not assessed against loose stove bolts to hold mud aprons in place, there being scarcely a truck without some of these bolts lost or having loose nuts. Manufacturers can make progress in this matter. No knowledge was taken of lost grease cups, if not from vital portions of the trucks. There were three or four examples of cups being lost although there were no cases of lost cups from vital points, what losses there were should be eliminated in future. The record follows:

FIRST DAY'S PENALTIES

Car		Points
No. 1, Vulcan:		
	Repairing broken chain	100
	Late 29 minutes	58
	Total	158
No. 2, Mais		0
No. 3, Little Giant:		
	Took gasoline twice out of controls	6
	Took water twice out of control	6
	Total	12
No. 4, Witt-Will:		
	Working on carbureter	37
	Replacing breaker-box	2
	Total	39
No. 5, Wilcox		0
No. 8, Rowe:		
	Repairing fan belt	44
	Motor stall	2
	Total	46
No. 9, Hupmobile		0
No. 10, McIntyre		0
No. 11, Autocar:		
	Taking water six times	18
	Stalled motor	2
	Total	20
No. 12, Lauth-Juergens		0
No. 13, Atterbury:		
	Taking water	3
No. 14, Atterbury:		
	Taking water twice	6
No. 15, Atterbury:		
	Repairing broken chain	17
	Adjusting carbureter	12
	Water, twenty-one times	63
	Total	92
No. 16, Atterbury:		
	Water, twice	6
	Work on floor boards	10
	Work on radiator petcock	13
	Total	29
No. 17, White		0
No. 18, White		0
No. 19, International		0
No. 20, Atterbury		0
No. 100, Brown:		
	Radiator cap, 1; hub cap, ; petcock	1
	Total	3
No. 101, Four-Wheel-Drive		0
No. 102, White		0

SECOND DAY'S PENALTIES

Car		Points
No. 1, Vulcan:		
	New bolt in fan belt bracket	30
	Tightening radiator cap	1
	Total	31
No. 2, Mais		0
No. 3, Little Giant		0
No. 4, Witt-Will:		
	Adjusting carbureter	3
	Work on breather pipe	1
	Total	4
No. 5, Wilcox		0
No. 8, Rowe:		
	Connecting gasoline line	1
No. 9, Hupmobile		0
No. 10, McIntyre		0
No. 11, Autocar:		
	Replenishing water	3
No. 12, Lauth-Juergens		0
No. 13, Atterbury		0
No. 14, Atterbury		0
No. 15, Atterbury:		
	Replenishing water	9
No. 16, Atterbury		0
No. 17, White		0
No. 18, White		0
No. 19, International		0
No. 20, Atterbury:		
	Replenishing water	6
	Tightening connecting-rods	116
	Replenishing oil	6
	Total	128
No. 100, Brown		0
No. 101, F-W-D:		
	Cleaning gasoline line	15
No. 102, White		0

THIRD DAY'S PENALTIES

Car		Points
No. 9, Hupmobile:		
	Leak in gasoline line 11 miles out of control	3
	Adjusting carbureter	5
	Total	8
No. 12, Lauth-Juergens:		
	Replenishing with oil	3
No. 17, White:		
	Working on carbureter and gasoline line	30
No. 1, Vulcan:		
	Fan bracket breaking loose injuring radiator work	10
	Replenishing with water	3
	Total	13
No. 8, Rowe:		
	Cleaning gasoline line and working on same	53
	Work	9
	Motor stop	8
	Total	70
No. 11, Autocar:		
	Adjusting carbureter and taking on water	9
No. 13, Atterbury:		
	Loose nut on driving sprocket of rear wheel, work on same	13
No. 15, Atterbury		22
No. 20, Atterbury:		
	Working on oiling system	24
	Replenishing with oil	3
	Total	27
No. 100, Brown:		
	Adjusting and cleaning carbureter	19
No. 101, Four-Wheel-Drive		10

FOURTH DAY'S PENALTIES

Car		Points
No. 1, Vulcan:		
	Adjusting brackets	12
	Water	3
	Total	15
No. 4, Witt-Will:		
	Adjusting carbureter	22
No. 8, Rowe		28
No. 11, Autocar:		
	Water	3
No. 12, Lauth-Juergens:		
	Engine bearings work	129
No. 13, Atterbury:		
	Replenishing of water and gasoline	6
No. 14, Atterbury:		
	Adjusting carbureter and cleaning gasoline line	63
No. 16, Atterbury:		
	Water	3
No. 100, Brown:		
	Stalled motor	1
No. 101, Four-Wheel-Drive:		
	Differential trouble to front axle	272

TECHNICAL EXAMINATION REPORT

Car		Points
No. 1, Vulcan:		
	Leaky radiator	20
No. 2, Mais		0
No. 3, Little Giant:		
	Hub flange bolt lost	1
	Six loose spokes	30
	Total	31
No. 4, Witt-Will:		
	One water connection leak	1
No. 5, Wilcox		0
No. 8, Rowe:		
	Water leak in hose connection	1
	Broken fender iron	6
	Gasoline leak	1
	Total	8
No. 9, Hupmobile		0
No. 10, McIntyre		0
No. 11, Autocar:		
	One lost muffler support bolt	1
No. 12, Lauth-Juergens:		
	Handle of carbureter shutter valve rod lost	1
No. 13, Atterbury:		
	Loose steering connection	14
	One nut lost	1
	Total	16
No. 14, Atterbury:		
	Leaky water connection	1
No. 15, Atterbury:		
	Loose muffler pipe	1
No. 16, Atterbury:		
	One water leak between cylinder and water jacket top plate	1
No. 17, White:		
	Loose steering connection	15
No. 18, White		0
No. 19, International		0
No. 20, Atterbury		0
No. 100, Brown:		
	Loose steering column dash bracket	2
No. 101, F. W. D.:		
	Broken differential	150
	Lost spring hanger bolt	1
	Total	151
No. 102, White		0

Horsepower as Basis For Tax Discussed

Majority of Prominent Automobile Engineers Consider S.A.E. Rating as Fair to All Concerned—Many Differ

Several Object to Making Horsepower of the Motor the Basis for Calculating Amount of State Tax

THE article entitled "Cars Taxed on Unused Horsepower," which appeared in THE AUTOMOBILE for March 27, aroused a great deal of interest among automobile engineers, and their letters on this subject have been numerous and very interesting. A number of them are published herewith:

S. A. E. Formula Under-rates Motors—Dunham

DETROIT, MICH.—Editor THE AUTOMOBILE:—In my estimation there is but one way to rate a motor, and that is by its actual performance at 1,000 feet piston speed and not by some formula which does not give a fair rating.

The A. L. A. M. rating of today for motors considerably underrates them. It seems to me that if we are to rate cars in connection with tax matters by a formula which will underrate them, we might as well make up a new formula which will underrate them still more.

I should think it would be better to be fair in the matter, and rate the motors according to their actual developments, and endeavor to get a reasonable tax on them.

However, it seems to me both methods are wrong. If you own a house or a piece of property, they do not rate you on how big the house is, or how many rooms you have in it, or the kind of furnace you have in it, but they rate you on the value of the house. Could anything be more fair in the way of automobile taxation than rating the cars according to the amount of money they are worth? Why should a man buying one of the low-priced cars with a big engine in it pay more taxes than the man who has been able to afford a high-priced car, with a small engine?

I understand of course, that the supposition is that the larger the car, the more wear and damage it gives to the roads, but would not the whole thing equalize up as well if based on the money value of the car?—GEO. W. DUNHAM, Chalmers Motor Co.

S. A. E. Formula Cannot Be Bettered—Lewis

MILWAUKEE, WIS.—Editor THE AUTOMOBILE:—While there have been many horsepower formulæ proposed and tried. I do not believe that the formula now accepted by the A. L. A. M. and the S. A. E. can be bettered under present conditions.

The vogue of the long-stroke motor, of course, has a new bearing on the subject, but too many of our legislators who are not thorough fail to recognize the fact that piston speed is the determining factor. All piston speed taken as standard under the above formula I do not believe that the average motor under average touring conditions would exceed its A. L. A. M. horsepower rating.

I desire to add voice to those who would retain, for the present at least, the standard of rating adopted by our foremost manufacturing and engineering bodies.—RALPH C. LEWIS, F. S. Motors Co.

No Other Formula Is Necessary—Fergusson

BUFFALO, N. Y.—Editor THE AUTOMOBILE:—I do not think that any other formula than the S. A. E. is necessary or desirable in connection with manufacturers' rating, either for catalogue purposes or for state taxes. Much misunderstanding about this rating would be cleared up if it was appreciated that this horsepower is the rating at 1,000 feet per minute piston speed of the engine under consideration. Although the better made engines can be operated to give a greater horsepower than this formula, yet I doubt if the average automobile after it has been in use for a few weeks will give more horsepower than the S. A. E. rating, due to the valves not being kept in the proper condition. A pleasure car in use on the road rarely, if ever, is called upon to develop its maximum horsepower. The average running speed is about 25 miles per hour and at this speed on good, level roads the horsepower developed by even high-powered cars is rarely over 9 or 12, and only when running through heavy roads or up steep hills is anything like the maximum power of the engine developed. We believe that it is under these conditions only that the engine is scarcely ever called upon to develop more than 75 per cent. of its maximum horsepower. It would, therefore, be wrong to tax pleasure cars according to their maximum horsepower. It would be better to have a formula that would give the average horsepower developed. For this reason, we believe that the S. A. E. formula answers all purposes.—D. FERGUSSON, Pierce-Arrow Motor Car Co.

It Is Merely a Matter of Income—Mears

CLEVELAND, O.—Editor THE AUTOMOBILE:—It appears to me that, if a state is anxious to secure a given income from motor car, the horsepower rating will have very little to do with it inasmuch as the tax from horsepower could be varied to suit any change that the manufacturers might make in their rating. If we cut our horsepower in two, it would be an easy matter for the state to double its rate per horsepower.—CHARLES W. MEARS, Winton Motor Car Co.

S. A. E. Formula Is Much Too High—Sweet

DETROIT, MICH.—Editor THE AUTOMOBILE:—While the S. A. E. formula furnishes a means for the customer to make some comparisons of the various motors, it is altogether too high for the purpose of taxation if the motor is to be taxed according to the average horsepower developed in road work.

I have made some brief tests to determine the actual amount of power developed to propel a five-passenger touring car, with two passengers in it, over the ordinary city streets and boulevards. In said test, an engine was used that according to the S. A. E. formula was rated at 32 4-10 horsepower. The test did not consider any rapid accelerations nor any hill work. We found that it only required an average of a little less than 8 horsepower to propel the car at speeds ranging from 18 to 22 miles per hour, which we consider an average speed for general road work. Therefore, the power actually required for the average level road conditions is less than 25 per cent. of the S. A. E. rating.

It seems that if the rating is to have consideration for taxation purposes, it would be more just to cut the present S. A. E. rating in two in the middle.—S. E. SWEET, Cadillac Motor Car Co.

Weight a Better Basis for Taxation—Crane

BAYONNE, N. J.—Editor THE AUTOMOBILE:—Personally I would be very sorry to see the manufacturers in this country induced as they have been on the other side to build motors of excessively small bore and long stroke by any horsepower rating system used by engineers or by the public authorities. As a matter of fact, from what we now know a rating depending entirely upon piston displacement would result in a very satisfactory engine development. I do not see that the question of rating has anything to do with the charge for licensing, which, if the license charge is fair at all, as I do not believe it is, should be based on weight as well as on horsepower.

Regarding the amount of power used on the road in cars of our manufacture, these cars develop their rated horsepower

under the S. A. E. formula at 750 revolutions, corresponding to a car speed of about 28 miles an hour with our standard rear axle gear ratio. All of us who have driven cars know that in this country an average speed of 28 miles an hour for a trip of any length is very high. As a matter of fact, under full throttle at 28 miles an hour our cars will hold their speed on a grade of at least 8 per cent. It is my opinion without having made any actual tests that the average horsepower delivered by the motor on ordinarily good roads is not over 25 or 30 maintaining a 28-mile average, and considerably less in maintaining a 20-mile average.—H. M. CRANE, Crane Motor Car Co.

S. A. E. Formula Is Not Consistent—Lee

DETROIT, MICH.—Editor THE AUTOMOBILE:—The horsepower rating of our motor is entirely due to the attitude of the buying public, who have been educated up to the prevalent practice of over-rating, which results from competitors endeavoring to utilize every possible selling point, any departure from which would be detrimental to the company.

The Briggs-Detroiter Co. stands ready to adopt any practical formula which will give a reasonable horsepower rating. However we do not consider the present S. A. E. formula as being consistent. Inasmuch as any motor whose dimensions are 3 3-8 by 3 3-8 will give the same results as one whose bore and stroke respectively are 3 3-8 by 5 inches.

It is safe to say that all automobile manufacturers would welcome any standard formula which would be approximately correct. If it were possible for all of them to come together in a meeting with their chief engineers, then there would be no doubt but what a thoroughly practical as well as simple mathematical computation could be formulated.—W. S. LEE, Briggs-Detroiter Co.

Stroke Should Be Considered—Stutz

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—I am of the opinion that the A. L. A. M. rating is no doubt somewhere near correct. Of course, there are some injustices in this rating owing to the proven fact that stroke does cut some figure with the amount of horsepower the motor is competent of delivering, but I am quite positive that the rated horsepower of a motor and a car as well should not be based on the maximum horsepower which it is possible to obtain, under the best possible condition, as the automobile does not remain in this condition when in the hands of the ordinary user only momentarily as the valves soon need attention, valve clearance is altered, carbon fixed and other instances happen which render the maximum horsepower rating absolutely worthless. The proportioned horsepower of the A. L. A. M. rating according to size of motor seems to be somewhere near correct, but the writer is of the opinion that stroke should be reckoned with in some cases.—H. C. STUTZ, Idieal Motor Car Co.

Volumetric Displacement Important—Averell

NEW YORK, N. Y.—Editor THE AUTOMOBILE:—The horsepower rating should be determined by the volumetric displacement and not upon the bore alone. I think this is both equitable and will lead to better motor proportions. I also believe that the taxation should be based on a combination of horsepower and weight. I know this sounds slightly complicated and may be rather difficult to work out, but the most destructive elements to the roads are certainly horsepower, which means available sustained speed and weight.—S. G. AVERELL, American Locomotive Co.

Standardization Is Needed—Reed

MARTINSBURG, W. VA.—Editor THE AUTOMOBILE:—I believe that many makers can obtain surprising results in the way of power from our motors. We cannot make the statement that 75 per cent. or even 50 per cent. of this is delivered at the point of contact of the rear wheels and the ground.

Taking the average six-cylinder touring car, which we will assume has a piston displacement of approximately 375 to 400 cubic inches and rated by the makers at 60 horsepower, more than that which the motor itself will develop on the block.

This car running at a speed within the reguations set down by law of 20 to 25 miles per hour in the country, is requiring but approximately 18 to 20 horsepower to drive it, and with the efficiency of power transmitting and speed-reducing machinery that has been reached today, 25 to 30 horsepower is the maximum you can credit to the motor, as it would probably be turning about 700 revolutions per minute.

The rating of gasoline motors for automobiles has become so complex that the layman has really no way of telling that a certain motor rated at 30 horsepower can out-pull two motors in cars of another make rated at 40 horsepower; and there should certainly be some standardization of this among the many other lesser matters which are brought to certain classifications.—W. S. REED, Norwalk Motor Car Co.

More Actual Horsepower—Potter

EAST ORANGE, N. J.—Editor THE AUTOMOBILE:—In any logical rating, such as the S. A. E. or one considering stroke, weight, price or size, is absolutely fair to all concerned. The necessary raise in taxation in order to keep the highways in good condition, together with the necessary or unnecessary increase in the price of gasoline makes it important that the American engineer should study and consider more thoroughly the absolute necessity of building a motor that will develop more actual horsepower.

Not only do the racing results of foreign countries, but also the stock road endurance runs show that the foreign engineer is getting more horsepower with less fuel consumption. A recent test made by the Automobile Club of America on one of the leading automobile manufacturer's motors showed anything but a satisfactory and economical result. The gasoline consumption as given by the average automobile salesman compares favorably with that actually obtained by owners of foreign machines, but the actual speed in miles per hour obtained by the American car owner falls short of that claimed by the salesman by 6 to 9 miles per hour.

I believe that the race on Decoration Day at Indianapolis will prove conclusively to the American engineer that he must consider more carefully the weight of moving parts, compression, valve diameters and lift, cam design, size, dual length of the intake manifold.—M. H. POTTER, Junior Member, Society of Automobile Engineers.

Surplus Power Tax Is Unfair—Batenburg

CLINTONVILLE, WIS.—Editor THE AUTOMOBILE:—In actual operation on highways, and especially in towns where the speed is limited, the amount of horsepower produced is far below the S. A. E. or A. L. A. M. rating.

The amount of power not produced to the wheels will depend more or less on the entire construction of the car, and the weight and type of body and character of load.

In my opinion the A. L. A. M. or S. A. E. rating is more than high enough on touring cars as well as trucks. Of course, in truck service the amount of horsepower produced will occasionally show higher than the above rating, especially by overloading, but, on the other hand, bear in mind the number of times that the car runs empty or with light load, and at low speed, and in such cases the power produced is way below the A. L. A. M. or S. A. E. rating. All automobile designers of today are figuring on sale overload and also to take care of a large amount of reserve power.

It is only a question of whether the secretary of state will give us credit for the amount of horsepower that is used under average conditions, which we would judge is full power only 25 per cent. of the time during the entire year. If we are charged up with surplus power during the idle period it would be unfair. —P. BATENBURG, Four-Wheel Drive Auto Co.

Accessories for the Automobilist

A. PETERSON, of the service department of the Garford company, New York City, has designed a valve spring compressor by means of which it is possible to raise the valve spring in 10 seconds and have both hands free when the spring is in that position to remove the key. The method of operation of this simple instrument and the principle upon which it operates may be seen in Fig. 1. The compressor consists of four parts:

1—A curved bar A, having a fork at its lower extremity. The fork slips beneath the lower spring support.

2—A right-angle bell-crank lever B. This operates in a clevis at the top of the curved bar and does the lifting.

3—A pin C, suspended from the bell-crank which fits into the center of the valve head and takes the thrust occasioned by compressing the spring.

4—A shoulder piece D, located on the pin. This fits into the valve aperture at the top of the cylinder and centers the pin so that it strikes the hole in the center of the valve head.

The operation will no doubt be clear from the foregoing description of the parts. The operator merely slips the lower end of the forked bar A under the spring seat at the bottom of the valve and the pin C down through the opening above the valve. The shoulder D will come over the opening in the cylinder caused by removing the valve cover. The bell-crank lever is moved from the position it occupies in the left view of Fig. 1 to the position shown at the right. This will cause the spring seat to be lifted up and will leave the pin free to be removed.

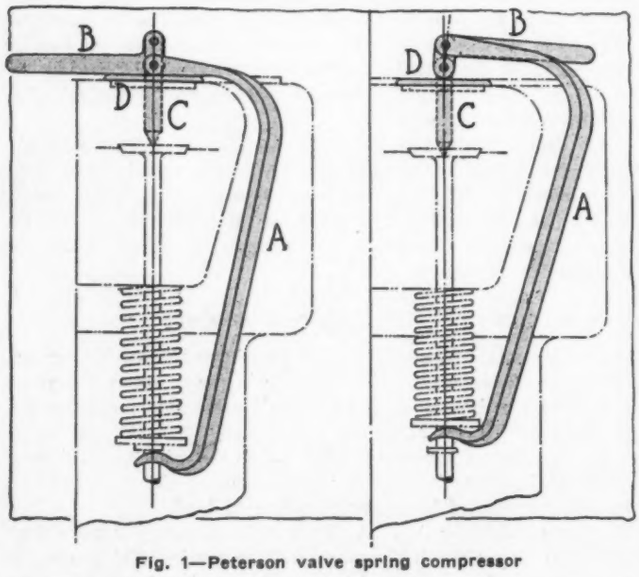


Fig. 1—Peterson valve spring compressor

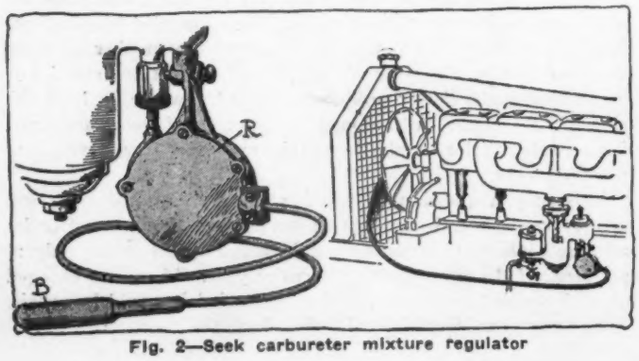


Fig. 2—Seek carbureter mixture regulator

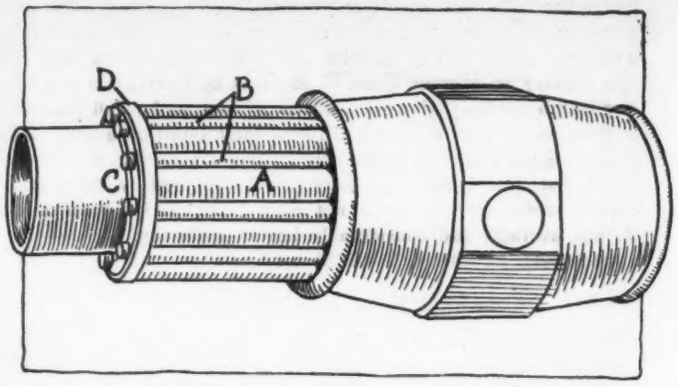


Fig. 3—American greaseless roller bearing

Owing to the fact that the bell-crank lever is slightly over the center position, the upward thrust tends to press the handle of the bell-crank more tightly against the top of the forked bar. In other words, it has no tendency to release the valve regardless of the amount of thrust.

The J. R. Almond Mfg. Co., Ashburnham, Mass., makes the flexible casing, Fig. 6, which is composed of a double-wound wire tube. The inner wire is of tempered spring steel and has a flat surface coiled toward the inside to support the flexible shaft; the outer wire coil provided to make the casing oiltight is of solid brass wire, rustproof, and has the appearance seen at the ends of the two sample pieces shown in the illustration.

Seek Regulator—A carbureter attachment designed to automatically regulate the mixture according to variation in the temperature of the water cooling system of the motor has recently been introduced by the Seek Regulator Co., Chicago. Fig. 2 shows the device A and the method of applying to motor. The Seek regulator may be attached to any make of carbureter without removing the carbureter from the car. Its operation depends on either the control of the air valve or the gasoline needle, according to choice or the particular make of carbureter. A flexible tube extends from the regulator itself to a bulb B, containing mercury, set against the motor side of the radiator and securely fastended there. The same result will be obtained if the bulb is applied within the water jacket, but it is preferably attached to the radiator so as to be sensitive to the temperature of the tubes and also to be influenced by air drafts. Whatever may be the temperature surrounding the bulb it influences the mercury in the bulb and immediately proportions the mixture, operating accurately within 1 degree indicated temperature and having a range of .3 inch of valve movement. When attached the carbureter is adjusted under normal weather conditions as nearly correct as possible, the regulator is then set in position to have no effect at this temperature, beginning to act only when the temperature of the water jacket falls below 180 degrees. It will then automatically care for the mixture. If a motor has been permitted to stand for some time in the cold this regulator will automatically give it a rich mixture at the start, and by degrees in accordance with the rise in the temperature will permit the mixture to weaken so that as soon as the motor has warmed to a temperature of 180 degrees it is running under normal conditions.

An anti-friction roller bearing requiring no lubricant has been designed by the American Roller Bearing Co., Pittsburgh, Pa., who claim to have tested it out on a 30,000-mile run. The construction is seen in Fig. 3, where alternate large rollers A carry the load, while smaller rollers B grooved at their ends act as separators, running in tracks C. Retaining rings D, which are freely movable, hold B in place. By this construction only rolling contact is obtained and all sliding friction is avoided.

The Elgin Spark-Plug & Ignition Co., Elgin, Ill., manufactures the spark-plug, Fig. 7. This plug consists of a steel shell, a steel bushing and a porcelain, which latter is separated from the shell by a copper ring and by an asbestos washer. The most interesting features of this plug are the specially designed porcelain and the electrode. The former is seen in Fig. 7, where the shell is cut away at one point. The shape of the porcelain is such as to form a primary ignition chamber above the lower, diverging end of the

porcelain, and the upper edge of this chamber is formed by the asbestos washer, which is pressed tight against the insulation by the very explosion pressure. The electrode is of wire bent in a right angle toward the shell, a metal cap forming a shield over it against the porcelain and preventing leakage of gas through the passage containing the wire.

An automatic carbureter, designed by the engineer Edouard Cannevel of Levallois, France, is shown in Fig. 9. The principle utilized in this carbureter is the breaking up of a liquid by means of a fixed orifice which is called a compensator in relation to the velocity of air passing through the carbureter. The design here illustrated not only has the ability of impoverishing the mixture in proportion with the decreasing suction, but it also permits of complete supression of the carburetion of air, when the motor reaches a certain velocity at which the suction created by it, the velocity of the air drawn in and the difference of fall between the two fuel orifices are at equilibrium. Coming to a description of the mechanism itself, the latter is of the float-feed type, the level of the fuel being a millimeter or two above that of the gasoline nozzle. The latter has three orifices, the top one being that which serves for principal action, while the two lower ones which are on one level permit of fuel leaving the inner lead and being diffused around the upper orifice, thereby breaking up the principal or, rather, the single jet. The canal into which the two lower orifices discharge before reaching the level of the upper orifice form a storage space in which fuel is kept for the purpose of starting, being available at the first bit of suction of the motor. In operation, the upper jet is the only one used at low speeds, when the motor suction is relatively small. When, however, the motor is accelerated by the opening of the throttle, the gasoline stored in the channel surrounding the lowest portion of the lead bored through the body of the nozzle is sucked up and mixed with the fuel discharged through the main orifice, thereby enriching the mixture. In order to protect the lower orifices against too great a suction, a disk is placed above them around the nozzle body, providing at the same time a larger surface for the fuel to cling to, which also facilitates evaporation.

The Ohio Top hoist, Figs. 4 and 5, is being made by the Ohio Top & Mfg. Co., Toledo, O., for the purpose of making it easy for one person to operate the automobile top. It consists simply of two long rods which attach to the points where the front and the rear uprights of the automobile top are united. As Fig. 4 shows, each rod consists of two sections, one of which is fastened to each of the points mentioned, they being held together by a screw-thread. The device is used in the following manner. If it is desired to put up the top, the driver attaches the rear sections, slips the front sections through the eyelet ordinarily used for attaching the front supports and then screws the sections together, which form a rod for the front support connection to slide upon.

The Johnson Steel Works Corp., Boston, Mass., manufactures the steel wheel illustrated in Fig. 8. The latter is built heavily of cast crucible steel alloyed with vanadium and titanium, and specially heat-treated. As a result the steel is tough, strong, ductile and well capable of resisting shocks. It is also made of acid-open-hearth steel, but the intention of the company is to use in the future only electrically-made steel and alloy steels of the above description. A tensile strength of 75,000 to 80,000 is thereby obtained, which is much in excess of the strength of any wooden wheel. The weight of such a steel wheel is of course greater than that of a wooden one, but to make up for that it is applicable to a wider field, being capable of carrying loads too great for wooden wheels. As Fig. 8 shows, the wheel is made both single and dual, with eight or ten spokes respectively. These wheels are shod with steel tires to give good service and seem to be recommendable, especially in the case of heavy trucks and omnibuses.

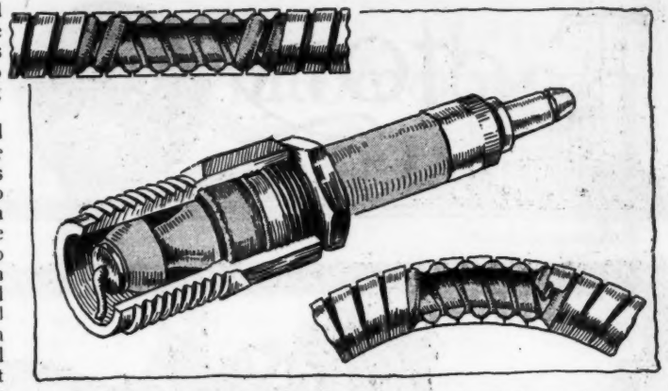


Fig. 6—Almond flexible casing. Fig. 7—Elgin spark-plug

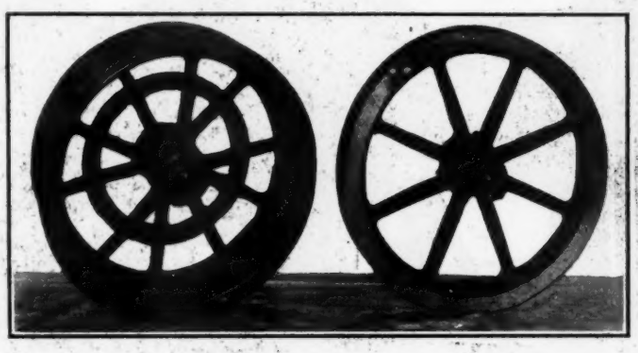


Fig. 8—Johnson steel wheel for commercial cars

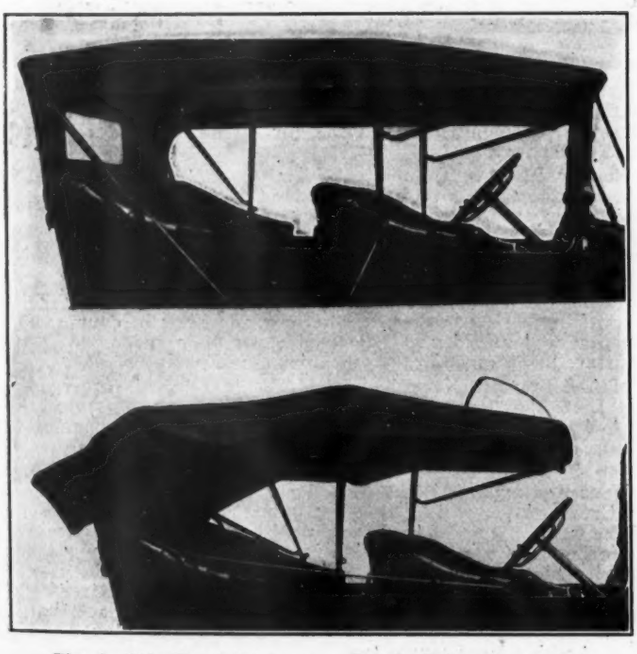


Fig. 4—Ohio Top hoist in use. Fig. 5—Being dismounted

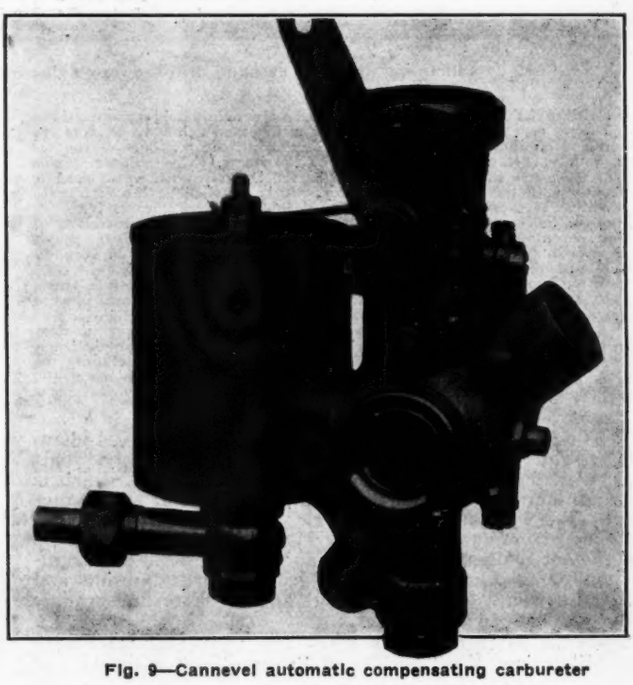
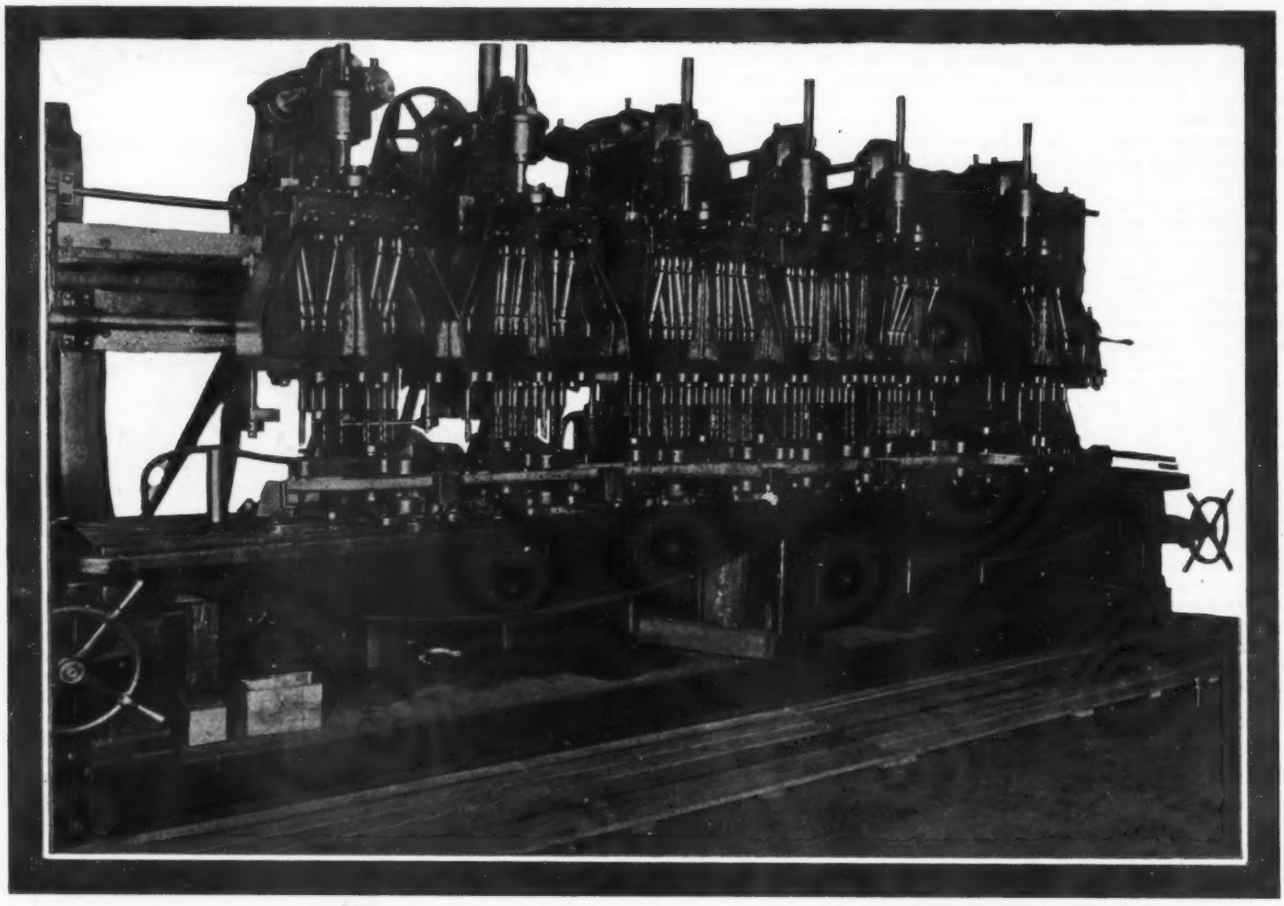


Fig. 9—Cannevel automatic compensating carbureter

Factory Miscellany



Cadillac multiple spindle gang drill for frame side members. It drills seventy-two holes in 30 seconds

AUTOMOBILE manufacturing work calls for many drilling operations. This is especially true of the frame members which have to take the connections binding the frame together besides all the members of the car itself, which are carried and supported by the frame. The multiple spindle drill in the above illustration is said to be the largest in the world used in connection with the automobile industry. It is installed in the factory of the Cadillac Motor Car Co., of Detroit, Mich., and is used exclusively for drilling the holes in the side bars of the frame. The machine is capable of drilling seventy-two holes at one operation. Two men working on this machine will drill all the holes in a frame side bar in about 30 seconds. **This is just thirty-six times as fast as would be accomplished by former methods—a gain of 3,600 per cent. in time.** A thousand right-side frame channels are drilled at one set up and then in 2 hours the drills and jigs are changed and the machine is ready for drilling the holes in a thousand of the left-side channel bars. The machine occupies 8 by 18 feet of floor space—just a little more than would be occupied by two single-spindle frame drilling machines with their stands for supporting the bars. Including the time for shifting the stock, etc., the capacity of this machine is about 100 pairs of side bars per day.

ESTERLINE'S New Factory—The Esterline Co., Indianapolis, Ind., moved into its new factory recently. This plant has a floor space of 108,000 square feet, which is an increase of more than 100 per cent. over the former plant. The building is three stories high, of reinforced concrete construction throughout. The employees number 200 and the entire plant at its full production will be in the neighborhood of 450. This company manufactures lighting and starting systems, lamps, headlights and the Esterline graphic meter.

Universal Machinery Has Fire—The Universal Machinery Co., Milwaukee, Wis., builder of Progress motor trucks and parts, sustained a loss of $5,000 by fire recently. Several departments suspended operations for 10 days while repairs were under way.

Rubber Plant in Columbiana—The Columbiana Land Co., Columbiana, O., has purchased a tract of land in that city on which they propose to erect a rubber plant. A. E. Albright of Carrollton, O., is president of the company and D. A. McIntosh of East Palestine is vice-president.

Marathon's Addition—The Marathon Tire & Rubber Co., Cuyahoga Falls, O., is arranging to enlarge its plant to take care of increasing business. The new additions in course of erection will afford 2,200 square feet of floor space. Additions are being made in the vulcanizing and puring rooms.

M-A-Z Plant in Kenosha—H. M. Mink, Edward Anderson and J. P. Zens have formed a corporation under the style of M-A-Z Concealed Hinge Co., capital stock $10,000, to manufacture hinges and locks for motor car bodies and other purposes. A plant will be established in Kenosha, Wis., at once.

Hans Equipment's Plant—The Hans Motor Equipment Co., La Crosse, Wis., will be the first industry to occupy a share of the 64-acre tract of land purchased by the Industrial Association of La Crosse to provide free factory sites for new industries locating in that city. The tract is touched by two trunk railroads and is connected with the Mississippi River by the Black River. The company is so crowded for space that several automatic machines have been anchored on planks and covered with a large canvas tent.

Milwaukee Motor's Increased Output—The Milwaukee Motor Co., Milwaukee, Wis., manufacturing motors and unit power plants for the trade, has increased its capital stock from $250,000 to $300,000. The plant was recently enlarged so that the output is at present from 40 to 60 per cent. in excess of the production a year ago.

Lamp Factory in Indianapolis—A factory for the manufacture of motor car lamps and sundries will be established in Indianapolis, Ind., by the newly organized Auto Headlight & Oscillator Co., in which N. E. Carter, C. R. West and C. F. Gordon are interested. The company has been incorporated with an authorized capitalization of $50,000.

Enlarge Hudson Plant—The Hudson Motor Car Co. is erecting a new building at Detroit, Mich. The new structure is to be 578 feet in length by 90 feet in width and will supplant the section of the factory grounds which resembled a tented city. The latter existed because contractors would not complete buildings fast enough to take care of the output of the cars.

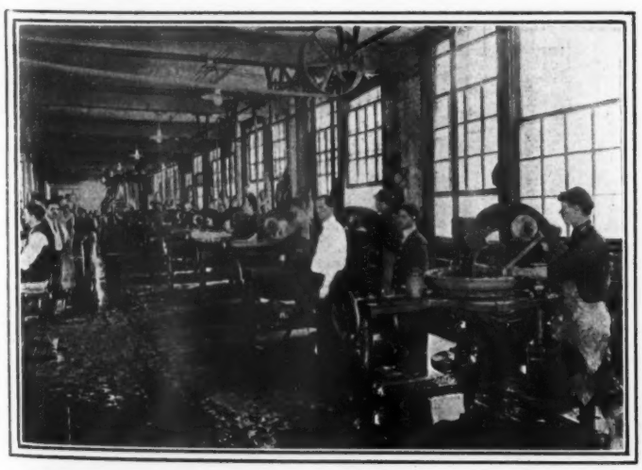
New Sheboygan Plant—The American Gas Engineering Co., Sheboygan, Wis., recently organized at that city with a capital of $50,000, has broken ground for a plant consisting of three buildings. The company will first engage in general machine work, cutting, welding, etc., and later intends to manufacture gas and gasoline engines. Automobile work will be featured.

Remodeling Building for S. & M. Tire—The remodeling of the old Premium building on Cambridge street, Coshocton, O., for the S. & M. Tire & Rubber Co. will begin at once The new industry, which is moving there from Akron, O., expects to be in operation within 90 days. The company expects to arrange for the erection of a steel plant for the manufacture of steel rims for tires.

John Brown's New Site—Announcement is made by the J. W. Brown Mfg. Co., Columbus, O., that a new site consisting of 5 acres on the Marion Road has been acquired and the work of constructing a modern plant will be started at once. This move was made necessary because of the large increase in the business of the concern, which manufactures automobile lamps and trimmings.

Power for Automobile Supply Factories—The Ross & Young Machine Co., which is erecting a new factory in Detroit, Mich., for building the Page automobile, is installing a 4-cylinder, 100-horsepower Bruce-Macbeth gas engine, which will supply power and light. The Willard Storage Battery Co., Cleveland, O., which a few years ago placed its fifth repeat order for these engines, recently placed another order for a 150-horsepower.

Proposed Plant at Jefferson—E. A. Woodruff of Jefferson, Wis., has had a conference in that town with W. G. Moore and C. J. Smith of Cleveland, O., with a view of interesting these gentlemen in the construction at Jefferson of an automobile factory. The company proposed to manufacture the body, but would buy wheels, tires, electrical equipment and motors outside the factory. The initial equipment will consist of a 250-horsepower gasoline engine, motors for machines, gas furnaces, hydraulic stamps, etc. A subscription of $40,000 to the company's capital stock is asked as a consideration of their coming to the city.



Wrapping room at the plant of the Goodyear Tire & Rubber Co., Akron, O. Here tires are wrapped prior to undergoing the second cure.

Shows, Conventions, Etc.

May 20-21.....Boston, Mass., Convention of Electric Vehicle Makers.
May 20-23.....Baltimore, Md., Spring Meeting, American Society of Mechanical Engineers.
June 2-7.....Racine, Wis., "Made in Racine Exposition," J. I. Case Co.'s foundry.
June 5, 6, 7.....Detroit, Mich., Midsummer Meeting of Society of Automobile Engineers.
Aug. 28-30.....Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent International Exhibition.
October .....Paris, France, Automobile Show, Grand Palais; 10 days.
Oct. 13.....Philadelphia, Pa., National Fire Prevention Conference, Philadelphia Fire Prevention Commission.
November .....London, Eng., Annual Automobile Exhibition, Olympia.

Race Meets, Runs, Hill Climbs, Etc.

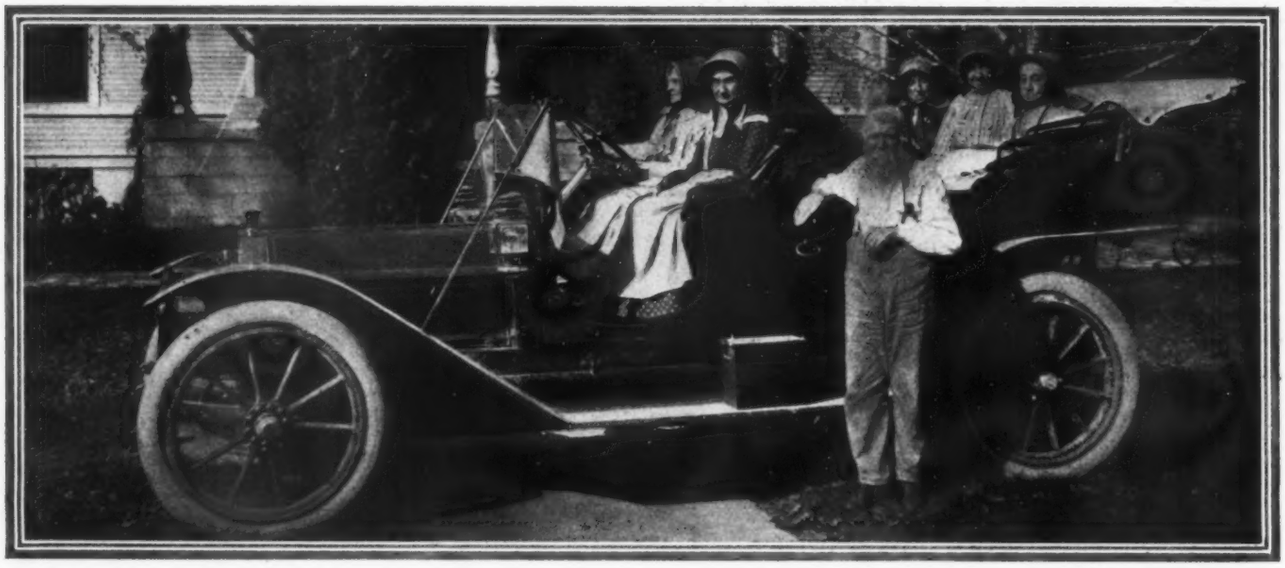
May 14-15.....New York City, Start of 2-Day Hudson and Catskill Scenic Tour.
May 17.....Atlanta, Ga., Automobile and Accessory Assn. Annual Hill Climb.
May 29-30.....Chicago, Ill., Inter-Club Reliability to Indianapolis, Ind., Chicago Motor Club vs. Illinois Athletic Club.
May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.
June 5.. .....New York City, Orphans' Day Picnic at Glen Island, Orphans' Automobile Day Assn.
June 7.....Philadelphia, Pa., Inter-Club Reliability, Quaker City Motor Club, Automobile Clubs of Delaware County, Philadelphia and Germantown.
June 14.....Cincinnati, O., Hill Climb, Cincinnati Auto Dealers.
June 16, 17, 18....Columbus, O., Reliability Contest, *Ohio State Journal*.
June 19.....Chicago, Ill., Algonquin Hill Climb, Chicago Motor Club.
June 21.....Cincinnati, O., Hill Climb, Cincinnati, O., Automobile Dealers.
June 25-28.....Chicago, Ill., Non-Motor-Stop Reliability, Chicago to Boston, Chicago Automobile Club.
July 1.....Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Assn. to the Pacific Coast.
July 1-16.....Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
July 4.....Columbus, O., 200-Mile Track Race, Columbus, O., Automobile Club.
July 4.....Taylor, Tex., Track Meeting, Taylor Auto Club.
July 4-5.....Sioux City, S. Dak., Track Meetings, Sioux City Automobile Club and Speedway Assn.
July 5-6.....Tacoma, Wash., Road Race, Montemara Festa Automobile Committee.
July 8-16.....Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 11.....Twin City, Minn., National Reliability Tour, A. A. A.
July 27.....Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
July 27-28.....Tacoma, Wash., Tacoma Road Races.
August 5.....Kansas City, Mo., Sociability and Endurance Run from Kansas City to Colorado Springs, Col., Kansas State Automobile Assn.
Aug. 12.....Kansas City, Mo., Reliability Tour, Kansas State Auto Assn.
Aug. 29-30.....Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6....Chicago, Ill., Reliability Run, Chicago Motor Club.
Sept. 1.....Columbus, O., 200-Mile Track Race, Columbus Auto Club.
Sept. 9.....Corona, Cal., Track Race, Corona Auto Assn.
Oct. 4-11.....Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups, Holding Company.
Nov. 27.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign.

May .....St. Petersburg, Russia, International Automobile Exposition, Building of Michael Maneze, Imperial Automobile Club of Russia.
June 3-7.....London, Eng., Third International Road Congress, Rees Jeffrey, General Honorary Secretary.
June 23-28.....London, England, International Road Congress.
July 12.....Amiens, France, Grand Prix Race.
July 13.....Paris, France, French Grand Prix Cyclecar Race.
July 18-26.....London, Eng., Imperial Motor Transport Conference.
Sept. 21.....Boulogne, France, 3-Litre Race.
Sept. 25.....Isle of Man, International Stock Car Race.
October .....Paris, France, Paris Automobile Show.

The Week in the Industry

Engineer — Dealer — Repairman — Garage



Six of the seventeen remaining Shakers of Union Village, near Lebanon, O., start out for a short run in their six-cylinder Pierce

Reo car converted into a motor lawn mower by the Quincy Country Club, Quincy, Ill. This car was a 1907 model. The mower cuts the grass in less than one-sixth the time and at less than one-fifth the cost at which it was formerly done. The 1,100 acres of ground on this golf course are cut at a cost of less than 35 cents per acre. The two-passenger body and rear system of this runabout are retained intact, while the front is supported by a triple-armed frame which converges down to the axle running through an iron roller 2 feet in diameter and 3 feet long across the chassis frame. A 3-foot mower is attached in front of this roller and another at the left side of the car. These two mowers cut a swath 6 feet wide, which, at the nominal speed of 6 miles per hour, would mean 11 acres per day of 8 hours. Assuming that the cost of gasoline is 20 cents and oil 50 cents per gallon, and the driver is paid $3 per day, the cost per acre would be less than 35 cents. A few Reo cars, as far back as 1905, have been converted into power plants for a hay-blower, corn sheller, farm tractor, threshing machine, hoisting apparatus, delivery truck or a score or more of other mechanically interesting contrivances

AGED ENJOY AUTOMOBILE COMFORTS—That the seventeen remaining Shakers of Union Village, near Lebanon, O., intend to enjoy the rest of their lives to the utmost may be gleaned from the above illustration. These seventeen survivors recently sold a part of their vast farm, receiving quite a tidy sum from the sale. As the oldest among them is 82 and the youngest is 51, it is evident that none will die in want and they have set out to enjoy the remaining years of their lives mid luxury and pleasure. Several automobiles have been purchased, among them being a Pierce-6, shown above. Nearly all the women, as well as the men can drive the cars.

HEADLEE LOS ANGELES MANAGER—F. M. Headlee has succeeded A. C. Lusby as manager of the Chalmers-Los Angeles, Cal., Co.

AKRON FIRM DOUBLES CAPACITY—The Akron Tire Co., Philadelphia, Pa., has doubled its capacity by absorbing the adjoining property, the two structures having been reconstructed into one building.

HOLZWORTH STEWART SALES MANAGER—George Holzworth has been appointed sales manager of the E. Stewart Automobile Co., Northern California distributer of the S. G. V. car in San Francisco.

DASEY HARTFORD SUSPENSION MANAGER—P. J. Dasey has been made manager of the Detroit, Mich., branch of the Hartford Suspension Co., Jersey City, N. J. His headquarters will be at 803 Woodward Ave.

BOSCH SERVICE STATION IN SPOKANE—The Bosch Magneto Co., New York City, has established a service station for the Inland Empire in Spokane, Wash., having arranged with the Spokane Cycle & Supply Co., to maintain this service.

MCDUFFEE STEARNS FRISCO MANAGER—J. H. McDuffee has been appointed manager of the San Francisco, Cal., branch of the F. B. Stearns Co., Cleveland, O. He succeeds J. F. Toole, who goes to Atlanta, Ga., to take charge of the Stearns interests in the South.

GOUDIE WITH PENNSYLVANIA TIRE—J. Q. Goudie, for some time past the manager of the Detroit, Mich., branch for the Diamond Rubber Co., Akron, O., has become associated with the Pennsylvania Rubber Co., Jeannette, Pa., in charge of Michigan and Ohio, with headquarters at Detroit.

PHILADELPHIA FIRM BANKRUPT—Creditors of the Sweeney Automobile Co., Philadelphia, Pa., have filed a petition to have that concern adjudged an involuntary bankrupt. The creditors and the amounts of the claims are: H. F. Hare, $750; T. F. Brennan, $266, and August Friend, $520.

CLEARING HOUSE IN LOUISVILLE—The Automobile Clearing House Co. of Louisville, Ky., has opened up offices and salesrooms at 708 Fourth avenue for the purpose of buying and selling second-hand and rebuilt cars. The managers of the new firm are W. J. Welsh and C. L. Holden.

GASOLINE WAR IN CALIFORNIA—A gasoline war is on in Southern California and as a result some of the dealers have cut prices to as low as 14 cents a gallon. How long this generous price will continue has not been determined, but it is declared that heavy losses will be sustained if the war does not end soon.

CLEARING HOUSE WANTED IN HARTFORD—A movement is on foot in Hartford, Conn., for the organization of a dealers' second-hand car clearing house. Many of the dealers are overburdened with second-hand vehicles at this time and in one or two instances a crisis is being faced. At the beginning of the season it was understood that no old cars would be taken in exchange for new, but the scheme fell flat. Competition is very keen. Now the dealers realize that the situation is becoming alarming.

COLE PARISH FACTORY MANAGER—The Parish Mfg. Co., Detroit, Mich., has engaged S. J. Cole as factory manager.

BURKE BUICK CLEVELAND MANAGER—D. A. Burke is the new manager of the Cleveland, O., branch of the Buick Motor Co., Flint, Mich.

KIRCHER MANAGER PACIFIC COMPANY—C. F. Kircher has been named manager of the truck department of the Pacific Car Co., Seattle, Wash.

BROOKLYN ORPHANS' DAY OUTING—The Orphans' Day Outing held by the Long Island Automobile Club, Brooklyn, N. Y., will take place on June 3 next.

SELLS SECOND-HAND CARS—The York Auto Exchange, York, Pa., has opened a garage at 26 North Duke street for the sale of second-hand cars and accessories.

LOUISVILLE CLUB QUARTERS MOVED—The quarters of the Louisville, Ky., Automobile Club have been moved from the Hotel Henry Watterson to the Inter-Southern building.

HARSH WITH SANDUSKY AUTO PARTS—W. H. Harsh has been made assistant general manager and assistant treasurer of the Sandusky Auto Parts & Motor Truck Co., Sandusky, O.

REYNOLDS WITH CHAMPION COMPANY—E. H. Reynolds, Jr., formerly connected with the selling of Warren cars, has gone to the Champion Ignition Co., Flint, Mich., as an Eastern representative.

REO'S LOUISVILLE QUARTERS MOVED—The Clark Motor Car Co., agent for the Premier and Reo cars, has moved its offices and salesroom from Green street to the new building at 206 East Broadway.

CHICAGO SAINT LOUIS TIRE BRANCH—The Saint Louis Tire & Rubber Co., St. Louis, Mo., recently opened a branch in Chicago, Ill., at 2027 Michigan avenue. Mr. Alexander Hendel is in charge.

NEW VELIE FORCE—A. W. Bartlett has been made general manager of the recently incorporated Velie Motor Car Co., St. Louis, Mo. W. J. Carter and C. F. Swartz are also connected with the company.

HOPKINS RESIGNS FROM ALCO—N. S. Hopkins has resigned his position with the American Locomotive Co., Providence, R. I., where he had charge of the main manufacturing department for the past year.

LOZIER'S OFFICES CHANGED—The Louisville, Ky., Lozier Co., agent for the Lozier, Paige and Palmer-Singer, has changed its offices and salesroom from Seventh street and Broadway to 405 West Broadway.

FRENCH DISTRIBUTOR FOR MOTOMETER—Y. D. Rose, of 34 Rue Du Mont-Thaber, Paris, France, has been appointed the sole distributor for France of Boyce Motometers. Mr. Rose will make his headquarters in Paris.

FIFTY-SIX AUTOMOBILES DESTROYED—Fifty-six electric automobiles were burned recently in a fire that destroyed a garage and storage warehouse in East Forty-seventh avenue, Chicago, Ill., the loss amounting to $250,000.

MORRIS GETS GOODYEAR MANAGERSHIP—M. E. Morris has been appointed Pacific Coast manager for the Goodyear Tire & Rubber Co., Akron, O., succeeding W. T. Powell, who has resigned. F. E. Carroll remains manager of the local branch in San Francisco, Cal.

LOZIER FACTORY BRANCH IN SEATTLE—The Lozier Motor Co., Detroit, Mich., will put a factory branch in Seattle, Wash. Carl Schnorr has arrived to take charge of the mechanical end of the business. The Lozier branch will have headquarters in the Motor Bldg.

NEW FRISCO HOME—The new home of the United Motors Co., San Francisco, Cal., located at Van Ness avenue and Cedar street, will contain 17,600 square feet of floor space. The showroom will cover an area of 40 by 70 feet and will be finished in pearl white.

TWO-MILE TRACK IN SEATTLE—H. W. Doherty has interested a large number of Seattle, Wash., dealers and motorists in the project to build a two-mile brick or cement track adjacent to that city. Actively associated with Mr. Doherty in the proposed track is D. G. Van Brunt.

DOVE WITH HAVERS—H. E. Dove, who has been acting in the capacity of branch manager for the Buick Motor Co., Cleveland, O., has become associated with the Havers Motor Car Co., of Port Huron, Mich., in the capacity of Pacific Coast manager for that company. His headquarters will be at San Francisco, Cal.

GOODYEAR BRANCH'S NEW STRUCTURE—The Louisville, Ky., branch of the Goodyear Tire & Rubber Co., Akron, O., is now located at 331 East Broadway. The new structure is equipped after the general scheme of all Goodyear branches in the country. Two stories and a basement are occupied by the branch, there being about $150,000 worth of stock in the building.

N. Y. PULLMAN ALTERING QUARTERS—The Stewart Automobile Co., New York City, handling the Pullman car, has been compelled, owing to business enlargement, to make a number of alterations in its building, 231 West 54th street. The entire ground floor has been turned over to the sales force. The upper floors will be devoted to academic purposes and the service department.

CHANGES IN AMERICAN MOTORS—A number of important changes are announced by the American Motors Co., Indianapolis, Ind., in its sales organization. D. B. Williams, advertising and publicity manager, has resigned that position to take a position in the sales organization as district sales manager, with headquarters at Louisville, Ky., covering a number of the Southern states and devoting his whole time to the dealers handling the American cars and the development of that territory. G. L. Moskovics, formerly assistant advertising manager under Mr. Williams takes the place made vacant by him. E. H. Sherwood has been appointed assistant sales manager.

INTERNATIONAL MOTOR COMPANY CHANGES—Recent changes in the motor truck field are announced by the International Motor Co., New York City; Ambrose Monell succeeds Edmund C. Converse as chairman of the board of directors; W. C. Dickerman retires from the position of chairman of the executive committee, leaving its duties temporarily to first vice-president John Calder. E. C. Fink, lately assistant to the president, has been elected third vice-president. D. C. Fenner resigns as New York sales manager to accept special duties in the general sales organization, and is succeeded by Kenneth M. Blake, who adds to his sales duties those of branch manager. R. E. Fulton becomes chief sales manager and R. G. Randolph is appointed New York service manager.

Alco car with 145,000 miles record which will compete in Chicago-Boston non-stop reliability contest June 25-29

One day's shipment of ten Reo roadsters to the American Radiator Co., New York City, for use by their traveling salesmen

WAVERLEY ELECTRIC MOVES—The Waverley Electric Co., New York City, has moved into new quarters at 1922 Broadway.

ANGLADA'S NEW OFFICES—J. A. Anglada has moved into new quarters at 1790 Broadway, in the United States Rubber Bldg., New York City.

NEW CONCERN IN DALLAS—A new firm has opened in Dallas, Tex., by the name of Knight & Mitchell. This concern will be dealers for the Liquid Tire Tonic and will be distributors for the entire state.

SACKS GRAY & DAVIS MANAGER—C. O. Sacks, president and treasurer of the Rowland Advertising Agency of New York, has accepted the position of advertising manager for Gray & Davis, of Boston, Mass. He will take up his new duties about July 1, with headquarters at the plant.

MOTOR TRANSPORT IN CEYLON—The Governor of Ceylon has agreed to receive a deputation from the Ceylon Planters Assn. and the Colombo Chamber of Commerce regarding the need of introducing motor transport services in the Colony and of making the roads suitable for this purpose.

UNIQUE GUIDE BOOK ISSUED—A unique guide book is being issued by the Kansas Automobile Assn., Kansas City, Mo., giving the leading roads between all the towns of the state as well as the ten leading trans-continental routes. It is being distributed free to the members of the association. It will not be sold to anybody.

HAYNES INCREASES STAFF—The Haynes Automobile Co., Kokomo, Ind., has appointed Robert Crawford as advertising and publicity manager and L. E. McKenzie as assistant in the sales department. The state of Kentucky has been assigned to F. C. Headington, who will act as field representative there.

TURNS LIGHT ON TRUE TAXI CONDITIONS—F. Ducasse who has been in the taxicab and taximeter business for many years has submitted to the special committee of the New York City Board of Aldermen a statement on the taxicab situation in the city. An array of facts is set forth by Mr. Ducasse to prove the undesirability of abolishing private stands and of decreasing taxicab rates.

SHERIDAN BUS LINE ORGANIZED—The Sheridan Motor Bus Co., Sheridan, Ind., has been organized to conduct a motor bus business, carrying passengers and light freight between Sheridan and Noblesville. The line will also work in conjunction with the Union Traction Co., of Indiana, connecting with the electric interurban line at Noblesville. Two motor buses with a capacity of twenty passengers each will be used.

SYRACUSE DISTRIBUTOR MOVES—E. P. Young, distributor for central New York of the Regal and Maxwell cars, has moved into his new quarters at 212 Jackson street, Syracuse, N. Y. It is a new two-story building of concrete and steel, the front of pressed brick and cut stone. The ground floor will contain the office, salesroom and the garage proper. The second floor will have the service station and repair shop and there is a hydraulic elevator.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

ATHENS, O.—City Automobile Co.; capital, $12,000; to deal in automobiles. Incorporators: Ura Butcher, Dana Connett, G. H. Junod, C. J. Allstock, Mabel Butcher.

AUBURN, N. Y.—Ross Automobile Co., capital, $10,000; to deal in automobiles. Incorporators: E. A. Ross, Maurice E. Tuller, H. A. Barr.

BOSTON, MASS.—Chandler Motor Car Co.; capital, $30,000; to deal in automobiles. Incorporators: R. O. Hood, E. G. Cleary, M. L. Albina Vincent.

BRITTON, OKLA.—Darling Automobile Mfg. Co.; capital, $25,000; to deal in automobiles. Incorporators: C. P. Stanley, A. W. Hedge, H. O. Crum, G. E. Crawford, S. L. Shintaffer, D. L. Sellers, W. C. Settle, H. S. Emmerson, C. L. Stealey.

CHICAGO, ILL.—Auto Sales Co. of Illinois; capital, $2,000; to deal in automobiles. Incorporators: T. J. Peden, R. C. Merrick, J. W. Yeager.

CHICAGO, ILL.—Beeler Slide Valve Motor Co.; capital, $20,000; to manufacture motors and machinery. Incorporators: T. Burleigh Beelers, M. A. Hirshl, S. B. Hirshl.

CINCINNATI, O.—Allen-Reed Tractor Co.; capital, $50,000; to manufacture and deal in tractor engines of all kinds. Incorporators: Allen Reed, L. J. Colle, H. W. Reedy, W. C. Taylor, E. B. Lamping.

CLEVELAND, O.—Woodland Garage Co.; capital, $5,000; to deal in automobiles and supplies of all kinds. Incorporators: Jake Soglovitz, A. E. Bernstein, B. J. Sawyer, Sadie Cohn, I. Nungesser.

DETROIT, MICH.—Wahl Motor Car Co.; capital, $500,000; to manufacture motor trucks. Incorporators: G. H. Wahl, J. E. Hofweber, A. J. Hofweber, M. Kratchwill.

FALL RIVER, MASS.—Fall River Automobile Co.; capital, $10,000; to deal in automobiles. Incorporators: A. H. Harrington, P. M. Leavitt, B. A. Levy.

JACKSONVILLE, FLA.—S. & B. Motor Co., Inc.; capital, $10,000; to engage in the handling of automobiles, motorcycles, bicycles and vehicles. Incorporators: B. D. Spinney, Joseph Lockwood, J. S. Bertram.

JACKSONVILLE, FLA.—White Sales Co.; capital, $100,000; to deal in automobiles. Incorporators: J. R. Collins, P. D. Casidey, N. A. Collins.

KANSAS CITY, MO.—E. Landin Auto Co.; to deal in automobiles. Incorporators: M. J. Oldham, W. G. Bryant, M. S. Kenney, W. L. Gregg.

LOUISVILLE, KY.—The Automobile Clearing-House Co.; capital, $2,500; to handle automobiles and supplies. Incorporators: C. L. Holden, W. J. Welch, C. H. Welch.

MONTREAL, QUE.—The Montreal Autobus Co.; capital, $10,000,000; to manufacture automobile buses. Incorporators: H. S. Holt, U. H. Dandurand, F. L. Wanklyn, D. McDonald, J. S. Norris, Tancrede Bienvenue, D. Lorne McGibbon, Paul Galibert, J. E. Wild.

NEOSHO, MO.—Neosho Auto Co.; capital, $3,500; to deal in automobiles. Incorporators: A. C. McGinty, J. F. Wills, S. D. DeLapp, F. S. Briggs, E. R. Rudy, O. L. Craven.

NEW YORK CITY.—Gallagher Carburetor Co.; capital, $300,000; to manufacture carburetors, engines, auto supplies. Incorporators: R. W. Gallagher, W. M. Foord, H. A. Johnston.

PEARL RIVER, N. Y.—Pearl River Auto Co.; capital, $5,000; to deal in automobiles. Incorporators: O. R. Kosel, Herman Gunther, Marie Kosel.

PORTLAND, ME.—M. B. Mank Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporators: M. B. Mank, A. E. Mank, C. F. Mank.

UTICA, N. Y.—E. D. & A. F. Cronk; capital, $75,000; to deal in automobiles. Incorporators: Harry Lancaster, F. H. Doolittle, O. J. McKeown.

WASHINGTON, D. C.—Washington Motor Car Co.; capital, $300,000; to manufacture automobiles. Incorporators: A. Gary Carter, Frank L. Carter.

GARAGES AND ACCESSORIES

AKRON, O.—Quality Tire & Rubber Co.; capital, $1,000; to manufacture and deal in automobile tires and rubber goods. Incorporators: R. E. Smith, J. G. Gulther, E. D. Smith, E. L. Smith, J. H. Robertson.

BELLEVUE, PA.—Bellevue Garage; capital, $10,000; to carry on a general garage business. Incorporators: E. A. Shaner, C. W. McCall, W. M. Barnhardt.

BUFFALO, N. Y.—Couch-Georger Tire & Mfg. Co.; capital, $10,000. Incorporators: C. A. Couch, E. F. Howell, F. P. Georger.

CHICAGO, ILL.—Federal Services Co.; capital, $2,500; to manufacture automobile supplies. Incorporators; L. O. Hack, R. S. Wertheim, S. H. Rothschild.

HAMILTON, O.—Star Taxicab Co.; capital, $5,000; to operate a taxicab and automobile service. Incorporators: G. C. Skinner, A. M. Skinner, William Miller, Merle Fenner, Millikin Shotts.

KENOSHA, WIS.—M-A-A Concealed Hinge Co.; capital, $10,000; to manufacture hinges and locks for automobile bodies and other purposes.

MIDDLETOWN, N. Y.—North End Garage Corp.; capital, $10,000; to carry on a general garage business. Incorporators: Edward Van Duser, J. G. Eager, F. P. Sheerin.

MINNEAPOLIS, MINN.—N. W. Liquid Tire Tonic Co.; capital, $50,000; to deal in automobile tires and accessories. Incorporators: F. M. Rutten, H. W. Ewing, L. P. Fay, A. G. Rose, Jr.

NEW YORK CITY.—Globe Auto Specialty Co.; capital, $4,500; to deal in automobile accessories. Incorporators: Jacob Stam, J. B. Stam, D. S. Mosseson.

NEW YORK CITY.—Globe Rubber Tire Mfg. Co.; capital, $1,500,000; to manufacture automobile tires. Incorporators: H. D. James, J. P. Hall, Spencer Weart.

NEW YORK CITY.—H-H-H Tire & Mfg. Co.; capital, $50,000; to manufacture and deal in automobile tires and rubber goods. Incorporators: John Dravis, W. C. Burroughs, J. J. Coyle.

NEW YORK CITY.—J-M Shock Absorber Co.; capital, $1,000; to deal in automobile shock absorbers, etc. Incorporators: Maurice Rosvold, E. Molancheir, Erle Aquist.

NEW YORK CITY.—Packard-Bretey Auto Renting Co.; capital, $2,500; to engage in automobile renting. Incorporators: Henry Pearlman, John Blumenthal, S. J. Loeb.

NEW YORK CITY.—Sunswick Garage and Livery Co.; capital, $2,000; to operate a garage. Incorporators: W. H. Quinn, P. J. McGlynn, T. J. O'Hanlon.

PHILADELPHIA, PA.—The New Idea Tire Co.; capital, $500,000; to manufacture automobile tires. Incorporator: F. R. Hansell.

PITTSBURGH, PA.—City Garage & Sales Co.; capital, $50,000; to carry on a garage. Incorporators: W. G. Venn, M. H. Ward, H. N. Stackpole.

PORTLAND, ME.—Berry & Winslow Garage Co.; capital, $10,000. Incorporators: Charles W. Berry, Ralph W. E. Winslow, Thomas A. Sanders.

TROY, N. Y.—Troy Auto-Bus Corp.; capital, $20,000; to operate an automobile bus line. Incorporators: John Burdick, E. L. Snydr, John McGlynn.

CHANGES OF NAME AND CAPITAL

CLEVELAND, O.—B. M. Allen Motor Sales Co.; change of name to the Velie-Paige Motor Car Co.

CLEVELAND, O.—Grant-Lees Machine Co.; change of name to the Grant-Lees Gear Co.

DETROIT, MICH.—Regal Motor Car Co.; capital increased from $1,000,000 to $3,000,000.

INDIANAPOLIS, IND.—Ideal Motor Car Co.; change of name to the Stutz Motor Car Co.

MASSILLON, O.—Croxton Motor Co.; capital decreased from $250,000 to $12,500.

New Agencies Established During the Week

PLEASURE VEHICLES

Place	Car	Agent
Aberdeen, S. D.	Hupmobile	Hanus Bros.
Birmingham, Ala.	Little	Thos. E. Morris, Jr.
Blair, Neb.	Hupmobile	U. G. Garner.
Cairo, Neb.	Hupmobile	Dell Thompson.
Columbus, O.	Apperson	G. L. Sitgreaves.
Columbus, O.	Mercer	G. L. Sitgreaves.
Columbus, O.	Simplex	G. L. Sitgreaves.
Creighton, Neb.	Pathfinder	C. C. Colby.
Fremont, O.	Abbott-Detroit	Younkman Bros.
Fremont, O.	R-C-H	Younkman Bros.
Fullerton, Neb.	Hupmobile	F. A. Billings.
Garfield, Wash.	Velie	Garfield Auto Co.
Genesee, Idaho	Velie	Meyer & Flomer.
Kenton, O.	Studebaker	Arnett Auto Co.
Little Rock, Ark.	Franklin	Jones & Lewis.
Logan, O.	Hupmobile	Main Motor Car Co.
Madison, Neb.	Hupmobile	Frank Kamroth.
Mansfield, O.	R-C-H	Myers & Morris.
Matador, Tex.	Franklin	Jack Luckett.
Morris, Ill.	Franklin	D. S. Huff.
Mullen, Neb.	Hupmobile	Gregg & Huffman.
Newman Grove, Ia.	Hupmobile	Newman Grove Auto Co.
Palouse, Wash.	Velie	Palouse Hardware & Implement Co.
Pampa, Wash.	Velie	A. Camp.
Philadelphia, Pa.	Inter-State	Chas. Walton, Jr.
Pullman, Wash.	Velie	B. F. Campbell.
Red Oak, Ia.	Hupmobile	Luther Brening.
Republic, Wash.	Velie	C. J. Tompkins.
Rosalie, Wash.	Velie	I. D. Lemley.
Rosalie, Wash.	Velie	Rosalie Hardware Co.
Schuyler, Neb.	Hupmobile	Schuyler Motor Co.
Tacoma, Wash.	Ford	W. C. Baldwin.
Tacoma, Wash.	Stutz	W. C. Baldwin.
Utica, Neb.	Hupmobile	W. C. Kenner.
Washington, D. C.	Hudson	Hudson Sales Co.
Washington, D. C.	Pullman	W. P. Barnhart & Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Columbus, O.	Chase	N. Morton.
Fort Plain, N. Y.	Stewart	H. B. Gray Co.
Herkimer, N. Y.	Stewart	G. E. Clark.
Hudson, N. Y.	Stewart	Wm. Petry Garage.
Johnstown, N. Y.	Stewart	Johnstown Motor Car Co.
Northampton, Mass.	Stewart	Draper Garage.
Red Bank, N. J.	Stewart	Fred H. Van Dorn.
San Francisco, Cal.	Autocar	M. S. Bulkley & Co.

ELECTRIC VEHICLES

Place	Car	Agent
York, Pa.	Standard	Charles E. Motter.